CAPE COD
COMMISSION

Pavement Management
2011 Status Report

October 2011

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1. Introduction

As an essential task required by the Cape Cod Unified Planning Work Program, this report provides the status of pavement condition assessment activities on Cape Cod. The objectives of this effort are to collect data and implement a regional pavement management system for Cape Cod to provide an objective rating of pavement conditions and needs.

The pavement management process is conducted with the intent to keep the roadway system in the best possible condition with the most efficient use of available funds. There are distinct advantages to managing pavement condition and significant cost savings that can take place with preventative or rehabilitation measures rather than waiting until a road is in need of reconstruction. As stated in the MPO-approved Cape Cod Regional Transportation Plan, the goal of the pavement management process is for all federal aid-eligible roads to be maintained in "excellent" condition. Of course, due to the reality of limited financial resources, it is necessary to prioritize pavement repair based on affordability. Deciding which roads to improve and by what technique in a fiscally responsible manner is the essence of Pavement Management.

1.1 PAVEMENT MANAGEMENT SYSTEMS - BACKGROUND

Pavement Management is the practice of planning for pavement repairs and maintenance with the goal of maximizing the value and life of a pavement network.

To accomplish this, a community needs to have several repair techniques in its arsenal and the knowledge of when to apply them. This is where pavement management comes into play. With a comprehensive database of road conditions, the pavement management system can model when to perform which repairs on a road network. Of course, engineering judgment is required to finalize any list of street repairs, as no computer model can take every variable analyzed in making a repair decision into account.

Below is a model of how a street's pavement deteriorates over time. Interpreting the curve, a street starts out in excellent condition when it is newly constructed. Midway through its life, a low cost repair such as crack seal and full depth patch will cost approximately a dollar a square yard. It takes only a few years for the window of opportunity to perform this low cost maintenance to pass after which the road would need an overlay costing $13 - $17 per square yard. By performing timely maintenance, road conditions can be improved today thereby extending the life of the road.

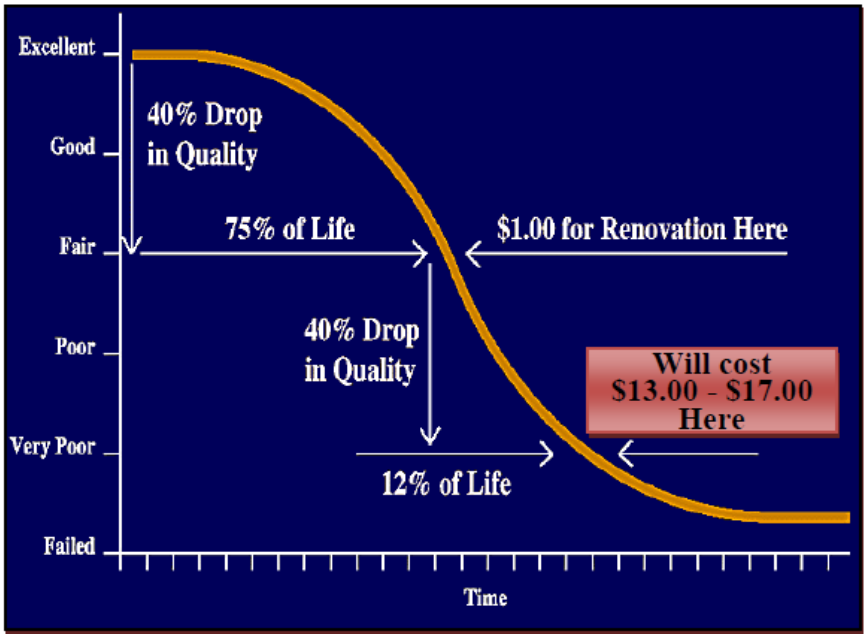

Figure 1 - Pavement Deterioration Curve

Source: Vanasse Hangen Brustlin

1.2 EVALUATION CRITERIA FOR CCC DATA COLLECTION

The Cape Cod Commission has collected pavement condition data in 2011 through two distinct efforts: a series of "Windshield Surveys" and at specific locations where the season traffic technicians were installing Automatic Traffic Recorders (ATRs). In both cases observers were given photographs and descriptions of example pavement distresses. Observers used a 1 – 5 rating system and made notations of particular distresses. Copies of the observations are provided in the appendix of this report. The following table is a summary of the guidance given to observers:

Table 1 - CCC Evaluation Criteria

Condition	Description	Criteria
1	Very Good to Excellent	No cracking rutting, raveling/ signs of wear
2	Good to Very Good	No cracking, rutting, showing a little wear
3	Fair to Good	Showing evidence or more wear and possibly repairs that are in good condition
4	Poor to Fair	Evidence of cracking, rutting, serious wear
5	Poor	Severe cracking, rutting, potholes

1.3 SURVEY OF CAPE COD COMMUNITIES' PMS ACTIVITIES

In early September 2011, and email survey was sent to each of the 15 towns' Department of Public Works directors. The survey included the following questions:

1. Do you maintain records of pavement quality on your community's roadways?
2. Can you send [electronically preferred] summaries of pavement quality assessments?
3. What system/method do you use to assess pavement quality?
4. Can you send us a report/documentation of methods used?
5. What method do you use to determine repair strategies?

6. Do you have estimated costs for implementing various repair strategies?

7. Can you forward us cost estimates sheets?

8. Do you have a capital plan for pavement improvement?

9. Can you forward us a copy of the capital plan?

There were five communities that responded. CCC will continue to seek input from the remaining 10 communities in the FY 2012 PMS update. The five communities' responses are summarized in the following sections. Four of the communities provided itemized responses to the questionnaire – these responses are presented in the appendix.

1.3.1 BARNSTABLE PMS ACTIVITIES

The Town of Barnstable utilizes detailed survey and analysis performed by VHB as a Consultant. Their work is entered onto Barnstable's database and periodic reports are provided and discussed. The DPW participates in the data analysis, particularly in the cost analysis. DPW reviews project bids received by the Town and establishes base line costs for each pavement treatment band, these costs are discussed with the town's consultant - then utilized in the pavement conditions report. In addition to the VHB work, the DPW maintains a record of roadway repairs and relies upon experience field personnel to assist in planning for individual maintenance tasks such as crack & chip seal. DPW also informally monitors the performance of all treatments. Key to the pavement management program is coordination with other utilities and proposed roadway rehabilitation information is passed to utility companies. A moratorium is in place for 5 years after application of a new surface. The Town of Barnstable does not maintain a public "5 year plan" - because of political considerations.

Submitted materials include:

- VHB-prepared "2010 Pavement Management Report." See section 1.4.1 for discussion of VHB Pavement Management Systems.

- Excel workbook containing typical costs for various items involved in pavement repair and related road work.

1.3.2 DENNIS PMS ACTIVITIES

The Town of Dennis has used VHB's Pavement Management for guidance since 1998. The term "guidance" is used because while VHB keeps Dennis' pavement quality records, does field verification on a 1/5th per year basis, grade Dennis' roads and make recommendations for repairs, the town has to spend road funds based on several factors that the program is not designed to consider. These local parameters are: some work in each of Dennis' 5 villages each year, reconstruction of failed roads, resurfacing of dirt roads and lumping the type of repair to give off-cape vendors enough to give the town a reasonable rate.

The town has not had an assessment prepared of estimated costs for various repair strategies for several years. The town's capital plan for pavement improvement allocates $600,000 per year for "secondary roads." Chapter 90 funds are used exclusively for primary roads.

1.3.3 HARWICH PMS ACTIVITIES

The Town of Harwich DPW utilizes an online database that was developed with Bonsai Logic (a small local software developer) to maintain a road inventory, to develop cost estimates, to reconcile DPW estimates against actual expenses and to maintain a roadwork history. The DPW does not utilize the database to develop a PCI (Pavement Condition Index). The town rate roads in 1 of 4 structural conditions: good, fair, deficient, or intolerable.

The DPW does have a 5 year road maintenance plan that is updated every few years and is available on the Harwich website. We use Chris Nickerson, Highway Road Manager who is a certified pavement inspector, to develop our plan based on his experience, training and knowledge of our 481 public roads (142 miles). The town attempts to balance maintenance with repair in an attempt to avoid costly reconstruction utilizing many different processes and procedures. For costs, the town utilizes county bid pricing (p. 2 of the town's 5 Year Maintenance Plan).

Submitted materials include:

- Summary of roadwork since 2005: excludes any TIP projects
- FY 12-18 Capital Plan – Proposed spending for town capital improvements including pavement maintenance/repair

- Roadwork job examples - Detailed itemized breakdown at pavement repair work at two town locations.

- 5 Year Road Maintenance Plan FY11-FY15 – detailed plan of various repair proposals for many town roads, including itemized costs.

- Harwich Road Inventory - 2010 listing of all town roads. Includes information such as surface width and type, condition (scale of 1 to 4), and length.

1.3.4 SANDWICH PMS ACTIVITIES

The Town of Sandwich retained the firm of Vanasse Hangen Brustlin (VHB) to perform pavement management services. A comprehensive study was undertaken to re-evaluate pavement conditions in Sandwich and to allow for the analysis of various funding scenarios. VHB performed a detailed inspection of the condition of the pavement on all town-maintained roads and updated a database of this information using VHB's "Road Manager" software.

To determine road repair strategies, the town mainly uses PCI (Pavement Condition Index) and Benefit. For estimated costs for implementing various repair strategies, the town uses the County's bid prices and incorporates these into their own spreadsheets. The town's 5-Year plan changes dramatically year-to-year but provides a guide to follow as funds become available.

Submitted materials included the following:

- VHB Presentation on Sandwich Pavement Management

- Road Program Map – color coded map of town roads assigned to years (2006 – 2010)

- Excel workbook listing town roads with PCI, Benefit, and Repair Alternative information

- Excel workbook itemizing bid costs for various repairs by various vendors

- Excel workbook itemized by road, listing planned paving projects

- Excel workbook itemizing repair type, treatment, and comments for town roads, separately for each year 2007-2011

- Pavement Management Update Study – VHB-prepared 2006 report. See section 1.4.1 for discussion of VHB Pavement Management Systems.

1.3.5 YARMOUTH PMS ACTIVITIES

The Town of Yarmouth retained the firm of Vanasse Hangen Brustlin (VHB) to perform pavement management services. VHB services consist of performing a comprehensive study to evaluate pavement conditions in Yarmouth and to allow for the analysis of various funding scenarios; perform a detailed inspection of the condition of the pavement on all town-maintained roads and update a database of this information using VHB's "Road Manager" software.

To determine repair strategies, the town reviews an initial list generated by the software and then decides whether to apply chip seal, double chip seal, or overlay. Main roads are treated with rubber chip seal or overlay. In the town's capital plan, annual spending ranges from $1.3 million to $1.5 million for roadway maintenance.

1.4 SUMMARY OF TOWN PMS EFFORTS

Based on responses from the September 2011email survey, the following table summarizes the techniques that responding towns use for pavement management.

Table 2 - Summary of Responding Towns' PMS Techniques

Town	Pavement Management Technique
Barnstable	VHB Pavement Management System
Dennis	VHB Pavement Management System
Harwich	Bonsai Logic Roadway Inventory
Sandwich	VHB Pavement Management System
Yarmouth	VHB Pavement Management System

1.4.1 VHB PAVEMENT MANAGEMENT SYSTEM

The most prevalent technique (as identified by all but one of the towns responding to the email survey) is the Pavement Management System developed by Vanasse Hangen

Brustlin (VHB). The following sections contain excerpts describing the VHB techniques. These techniques are included in the reports submitted by the various towns:

1.4.1.1. Methodology

VHB performed a detailed condition evaluation of each town's public roadways to build the pavement management system. The first step was to identify the roadway network. The second step was to further break each street in the roadway network into pavement management sections. The third step was to carefully categorize, measure, and record the individual pavement distresses within each pavement management section and perform the inventory of sidewalks, curbs, and ramps. Finally, the fourth step was to customize the road repair treatment selection and unit costs within the pavement management software through discussions with Town officials. All these steps were performed prior to the study of future funding scenarios.

Network Identification

Network Identification builds an inventory of streets that describe the municipality's complete roadway network. The direction of travel, street length, width, ownership, classification, zone and pavement type are among the items identified at this initial phase in the pavement management process. This integral step ensures the streets surveyed are the definitive set to be analyzed.

Pavement Management Section Identification

Once the Network Identification is complete, the field work begins. Each street contains one or more pavement management sections. A pavement management section defines the limits of previous construction or maintenance activities within each street. Sections are defined by having the same width, typical distresses, functional class, etc. The goal is to set up homogenous areas of pavement to aid in assigning the appropriate repair. A street may be one section, or it may be comprised of several pavement management sections, depending on its construction history.

Surface Distress Assessment

For each pavement management section, the severity and extent of nine major pavement distresses are recorded, and then entered into a weighted formula to arrive at a Pavement Condition Index (PCI). The distresses are categorized as base related or surface related distresses. Base related distresses indicate that the pavement structure is inadequate for the existing traffic load and soil conditions. Streets that show significant base related distresses may need to have the pavement structure strengthened with either thicker or stronger base or pavement materials. Surface related distresses are

caused by age and weathering of the pavement. Streets that have predominantly surface related distresses are excellent candidates for maintenance sealing to inhibit further pavement oxidization (the main effect of aging). Streets with more of the base related distresses will most likely need some full depth patching, structural overlays or reclamation/reconstruction.

The four base related distresses are:
- potholing or non-utility patching
- alligator cracking
- distortion
- rutting

The five surface related distresses are:
- block cracking
- transverse or longitudinal cracking
- bleeding or polished aggregate
- surface wear or raveling
- shoving, slippage or corrugation

PCI Defined

A PCI is generated for each inventoried pavement management section in the town using the surface distress data collected by VHB. PCI is measured on a scale of zero to one hundred, with one hundred representing a pavement in perfect condition and zero describing a road in impassable condition. Each type of observed pavement distress is assigned a deduct value based on the type, severity and extent of the distress. A weighted sum of the deduct points is subtracted from the perfect "one hundred" road in order to generate a PCI for each pavement management section. In general, base related (pavement foundation) distresses are weighted more heavily than surface related distresses. For example, if 15% of a road section had medium severity "Alligator Cracking" it would receive a deduct of 40 points. Whereas the same area of "Block Cracking" would only receive a deduct of 15 points. The actual PCI calculation follows:

PCI = 100 – (Highest Deduct Value) – (25% of remaining base related deduct values) – (10% of remaining surface related deduct values)

The Five Treatment Bands

The pavement management system uses broad ranges to group the individual repair types into five major treatment bands. Treatment bands are a useful tool to summarize data on a Town-wide basis. An individual road segment will fall into a particular category based on the strategy table's output of repair types and will vary due to functional classification. The goal is to gain a broad understanding of the existing conditions in simple yet meaningful terms.

Table 3 - Treatment Band Descriptions

TREATMENT BAND	PCI*	Description
DO NOTHING	93-100	Excellent condition - in need of no maintenance.
ROUTINE MAINTENANCE	86-92	Good condition – may be in need of crack sealing or minor localized repair.
PREVENTIVE MAINTENANCE	76-85	Fair condition – pavement surface may be in need of surface sealing, full depth patch and/or crack sealing.
STRUCTURAL IMPROVEMENT	56-75	Deficient condition – pavement surface structure in need of added strength for existing traffic. Typical repairs are overlay with or without milling.
BASE REHABILITATION	0-55	Poor condition – in need of base improvement. Typical repairs are reclamation or full depth reconstruction.

**Note: Treatment bands are defined below. These are only general PCI ranges for reference purposes, and represent only one pavement type. There are several fields considered by the strategy table when assigning repair types to each individual street. Source: VHB*

Do Nothing

The Do Nothing category exhibits roads which are in need of no maintenance. These roads are in excellent condition and existing distresses generally do not need to be addressed.

Routine Maintenance

Routine maintenance activities are those which are taken to correct a specific pavement distress. Routine maintenance usually addresses localized pavement defects and includes activities such as:

- Full depth patching;
- Skin patching;
- Crack sealing.

Preventive Maintenance

Preventive maintenance activities are those which are performed at planned intervals to protect and seal the pavement. Seals are designed to provide one or more of the following benefits:

- Prevent the intrusion of air and moisture;
- Fill small cracks and voids;
- Rejuvenate an oxidized binder;
- Provide a new wearing surface.

Structural Improvement

Structural improvement includes the work necessary to restore the pavement to a condition that will allow it to perform satisfactorily for several years. Generally a structural improvement will consist of a milling the existing pavement down and applying a new Hot Mix Asphalt Overlay allowing existing grades to be maintained. When the existing grade can be increased a new Hot Mix Asphalt course can simply be placed upon the existing surface. Structural improvements also include the work necessary to prepare the pavement for an overlay, either with or without milling. The major activities involved in the rehabilitation process are:

- Partial depth patching;
- Full depth patching;
- Joint and crack sealing.
- Grinding and milling
- Hot Mix Asphalt Leveling Courses.

Base Rehabilitation

Base rehabilitation utilizes one of two methods:

- Reclamation;
- Reconstruction.

Reclamation is the process of rehabilitating existing deteriorated pavements. The existing pavement and base, subbase, and possibly subgrade are pulverized and blended to create a homogenous pavement base. This reclaimed pavement base is then paved with a new Hot Mix Asphalt surface. Reconstruction is the complete removal and

replacement of a failed pavement, and might also involve widening, realignment, traffic control devices, safety hardware, and major base and drainage work.

Customizing Repair Strategies

VHB meet with the Town DPW to review VHB's typical repair strategies, and to learn how to customize these strategies to meet the Town's specific needs. VHB also refines repair unit costs. VHB's goal was to understand the town's decision making process and simulate that process in the budget analysis software based on the pavement condition and other criteria of each pavement section.

Preparing Budget Scenarios

Once the roadway conditions are inventoried and analyzed, and the repair strategies are defined, the impact of various spending programs on the roadway network is assessed. These studies can range from 1 to 20 years; typically 5-year studies are used. The purpose of the budget planning process is to determine the impact of various spending levels to find a funding level that will best meet the town's needs. The budget analysis software uses pavement deterioration curves, unit costs, and the strategy tables developed in the repair strategy definition phase to assign each street a repair type and associated cost for each year of the study. The software also assigns each street a benefit value that is used to prioritize which streets the software will select for repair each year. It is important to understand that a pavement management system is a network-wide planning tool, and is not intended to give definitive street-by-street repair data. Field verification and testing are recommended to confirm any street repair list generated.

Deterioration Curves

In order to properly plan for future repairs, the budget analysis feature of the pavement management system uses deterioration curves. The deterioration curves estimate the rate at which the pavement condition decreases over time. These pavement deterioration curves depict two major categories of functional classification - arterials and collectors in one curve and local roads in the other. An example deterioration curve is presented in the following figure:

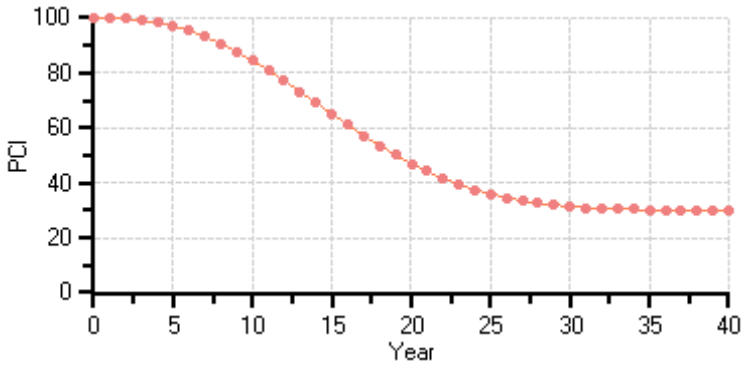

Figure 2 - Sample Deterioration Curve

Source: VHB

Strategy Table

The pavement management system uses a table of repair strategies to assign specific road repair types to individual roadway segments. The repair strategy table incorporates PCI ranges as well as functional class and pavement type to simulate decisions consistent with Barnstable's repair practices and procedures.

Project Prioritization

The budget analysis software prioritizes needed system repairs based on the estimated "Benefit Value". The Benefit Value formula is calculated using variables representing traffic volume, repair service life, PCI, and unit repair costs for each pavement management section. For each plan year, the software prepares a future roadway condition projection, exhausts the assigned budget, and then produces an annual list of roads included in the repair program. The system also allows the user to enter an inflation rate to account for estimated increases in future year construction costs. A 4% inflation rate is typically used.

The Benefit Value prioritization process generally favors cost effective maintenance alternatives. Repair actions are typically delayed on those sections that require reconstruction or major rehabilitation because the benefits for dollars spent are generally lower than maintenance candidates. After the relatively good roads are "saved", improvements are directed towards the poorer arterial and collector roads, and then to the local roads in need of major rehabilitation.

1.5 ANALYSIS

The data collected in the monitoring process will be continually compared to the measures developed to define pavement conditions throughout municipal roadways on Cape Cod. The data will be used to identify deficiencies and develop strategies for improvement.

1.5.1 MASSDOT EVALUATIONS OF PAVEMENT CONDITIONS

As seen in the following table presented in the Cape Cod Regional Transportation Plan, the Cape Cod Region possesses 738.98 miles of roadway eligible for federal funding. Of those miles, 541.19 are under the jurisdiction of the Cape's local communities.

Table 4 – RTP MassDOT Data Available by Jurisdiction

		Jurisdiction - Ownership				Available Data for Local Jurisdiction	
	Total Miles	MassDOT	%	Municipal	%	Data Miles	%
Cape Cod	738.98	197.79	26.77%	541.19	73.23%	85.25	15.75%

MassDOT evaluates roads under their own jurisdiction and a selection of municipally-owned roadways. The following table lists the corresponding rating from Excellent to Poor, based on a "PSI" rating – roughly analogous to the "Pavement Condition Index" (PCI) commonly used.

Table 5 - MassDOT Evaluation Criteria

Pavement Condition	Excellent	Good	Fair	Poor
"PSI" Range	PSI >= 3.5	PSI 2.8-3.5	PSI 2.3-2.8	PSI <2.3

The following map identifies the roadways that have been evaluated (shown in red) and those that lack evaluation (shown in blue).

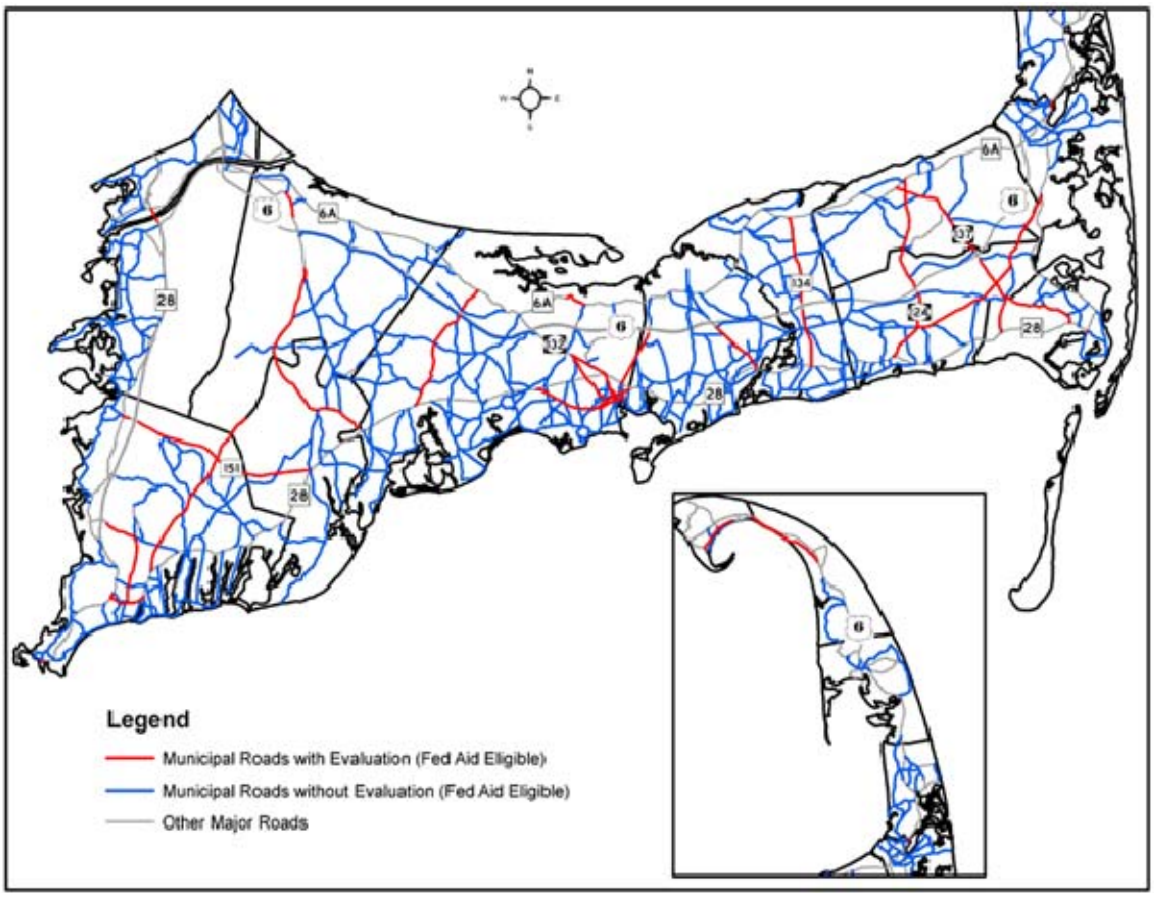

Figure 3 - MassDOT Evaluation of Municipal Roads

A recent effort undertaken by the CCC technical staff utilizing recent Massachusetts Roadway Inventory information has identified a slightly lower mileage (80.09) of federal-aid eligible municipal roadways with pavement condition evaluation (vs. 85.25 miles in table above). As seen in the table below, MassDOT Roadway Inventory information is available for 80.09 miles of federal-aid eligible municipal roadways. 22.17 of those miles are in "excellent" condition, almost 20.5 miles are in "good" condition, 30.71 miles are in "fair" condition, and about 6.7 miles of evaluated roads are in "poor" condition.

The Geographic Information System pavement file shows 1,040 road segments of varying length evaluated for pavement condition between 2006-2009. Over 800 of these segments were evaluated in 2009, less than 200 were evaluated in 2006, and the remainder in 2007-2008.

Table 6 - MassDOT Roadway Inventory Pavement Conditions - Miles

Town	Excellent	Good	Fair	Poor	Totals
Barnstable	1.72	2.73	7.94	3.66	16.04
Bourne	0.41	0.00	0.00	0.00	0.41
Brewster	1.19	1.53	4.48	0.00	7.20
Chatham	1.14	1.34	1.33	0.00	3.80
Dennis	1.26	1.23	2.24	0.20	4.92
Eastham	0.00	0.00	0.00	0.14	0.14
Falmouth	4.63	5.30	4.68	0.48	15.09
Harwich	3.15	1.56	5.56	0.59	10.86
Mashpee	3.93	1.03	1.90	0.17	7.04
Orleans	0.33	0.28	0.00	0.00	0.61
Provincetown	0.00	0.54	0.63	1.12	2.29
Sandwich	1.98	1.45	0.85	0.00	4.27
Truro	1.19	2.13	0.90	0.35	4.56
Wellfleet	0.00	0.00	0.00	0.00	0.00
Yarmouth	1.25	1.39	0.22	0.00	2.86
Totals	22.17	20.50	30.71	6.70	80.09

Source: MassDOT, 2006-2009 Data

The maps in the following figures shows the four categories of pavement condition(see Table 5) on the MassDOT-evaluated roadways available in a series of three maps (Upper Cape, Mid Cape, and Lower Cape). The MassDOT evaluations are shown as thick solid colored lines ranging from Blue (Excellent) to Red (Poor).

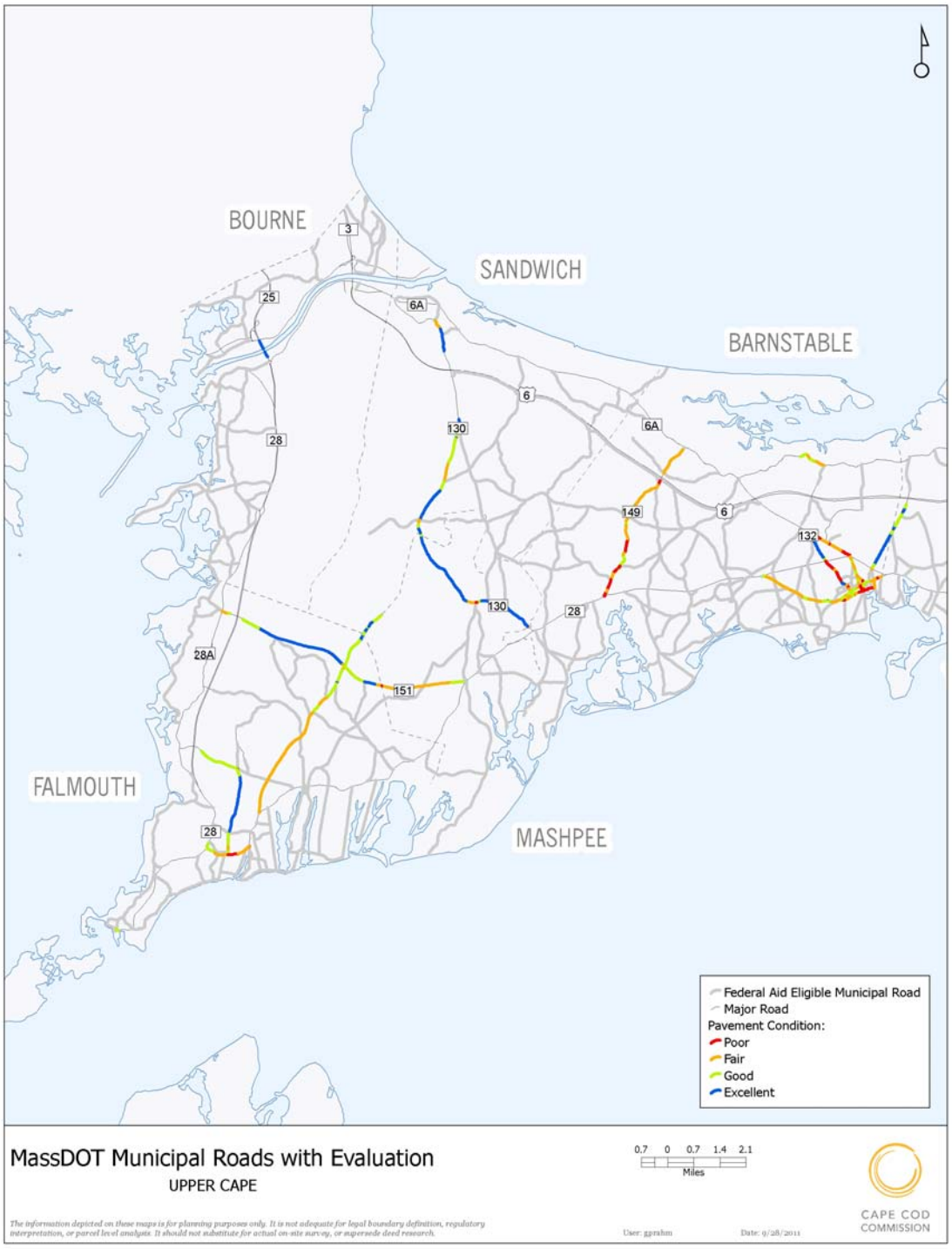

Figure 4 – 2006-2009 MassDOT Evaluation of Municipal Roads: Upper Cape

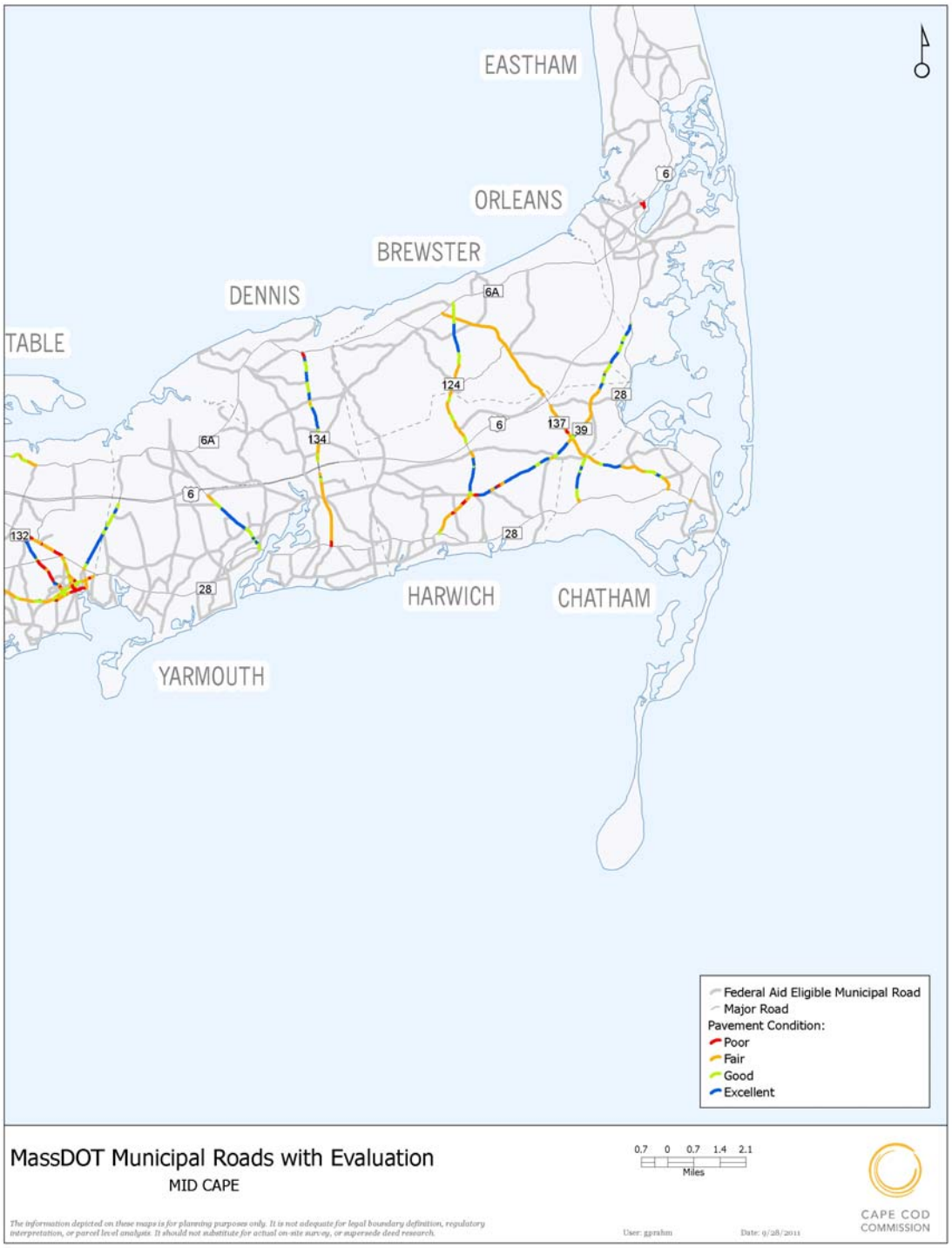

Figure 5 -2006-2009 MassDOT Evaluation of Municipal Roads: Mid-Cape

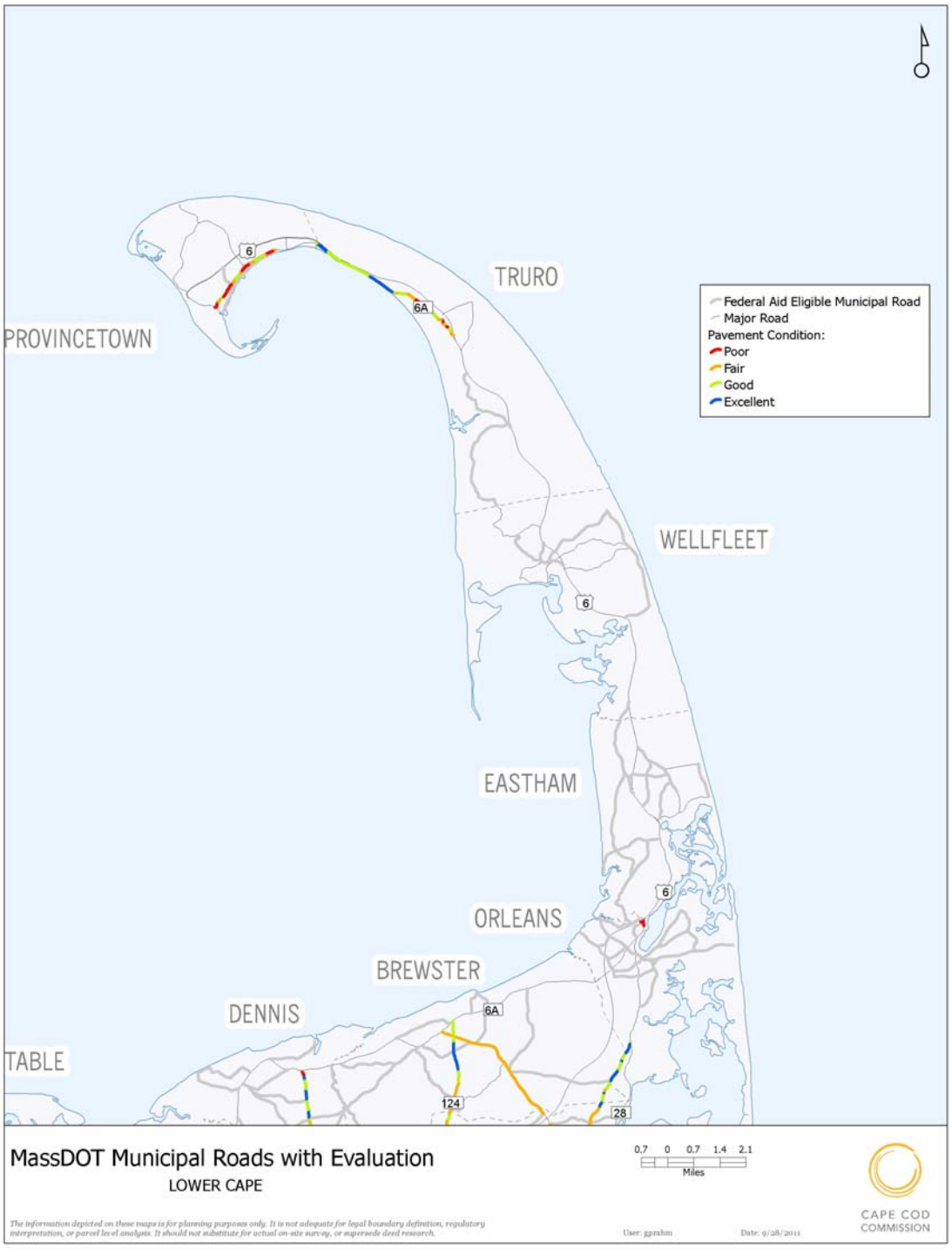

Figure 6 – 2006-2009 MassDOT Evaluation of Municipal Roads: Lower Cape

1.5.2 CCC EVALUATIONS OF PAVEMENT CONDITIONS

Using the MassDOT pavement evaluation discussed in the previous section as a basis for new data collection, CCC staff undertook a series of Windshield Surveys throughout Barnstable County. Selecting at least one road in each town listed as "Municipal Roads without Evaluation," CCC staff observed pavement conditions according to the criteria in Table 1. Copies of the detailed observations are available in the appendix.

The following table provides a summary by town of CCC survey data.

Table 7 - CCC Surveys of Pavement Condition - Miles

Town	(1) Very Good to Excellent	(2) Good to Very Good	(3) Fair to Good	(4) Poor to Fair	(5) Poor	Totals
Barnstable	0.00	0.47	1.73	1.17	0.20	3.57
Bourne	0.00	1.70	6.15	0.00	0.00	7.85
Brewster	0.00	0.00	1.21	5.02	0.00	6.23
Chatham	0.00	0.00	1.44	0.00	0.00	1.44
Dennis	0.00	1.35	3.17	2.27	0.04	6.82
Eastham	0.00	0.00	4.55	0.00	0.00	4.55
Falmouth	0.00	0.00	4.24	1.86	0.27	6.37
Harwich	0.00	4.51	0.20	0.00	0.00	4.70
Mashpee	0.00	2.13	2.68	0.00	4.13	8.94
Orleans	0.00	0.80	1.98	0.00	0.00	2.78
Provincetown	0.00	0.13	0.36	0.04	0.00	0.54
Sandwich	3.33	3.85	1.75	0.00	0.00	8.93
Truro	0.00	0.00	0.85	1.91	0.00	2.76
Wellfleet	0.00	1.14	2.07	0.00	0.00	3.21
Yarmouth	0.00	0.00	0.59	2.73	0.62	3.94
Totals	3.33	16.09	32.95	15.00	5.26	72.64

Source: Cape Cod Commission, 2011 Observations

As shown in the table above over 72 miles of survey data were collected throughout the 15 towns of Barnstable County in summer/fall of 2011. The most common rating (3 – Fair to Good) yielded almost 33 miles. This is followed by over 16 miles of rating level 2

– Good to Very Good and 15 miles of rating level 4 – Poor to Fair. There were over five miles of rating level 5 – Poor observed and just over three miles of rating level 1 – Very Good to Excellent.

The following figures provide a graphic of the CCC survey data in a series of three maps (Upper Cape, Mid Cape, and Lower Cape). The CCC evaluations are shown as colored parallel lines ranging from Blue (Very Good to Excellent) to Red (Poor).

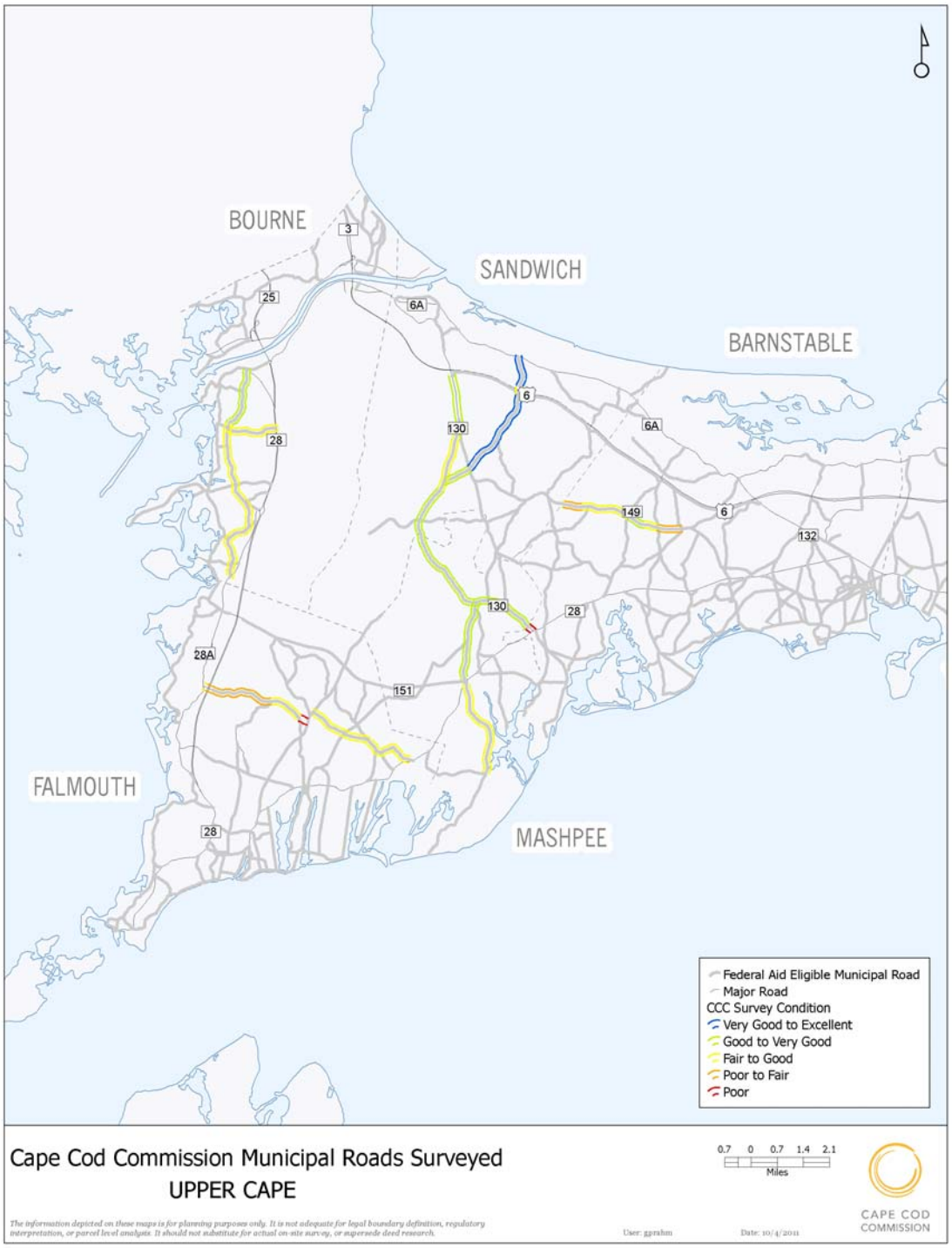

Figure 7 – 2011 CCC Pavement Condition Surveys: Upper Cape

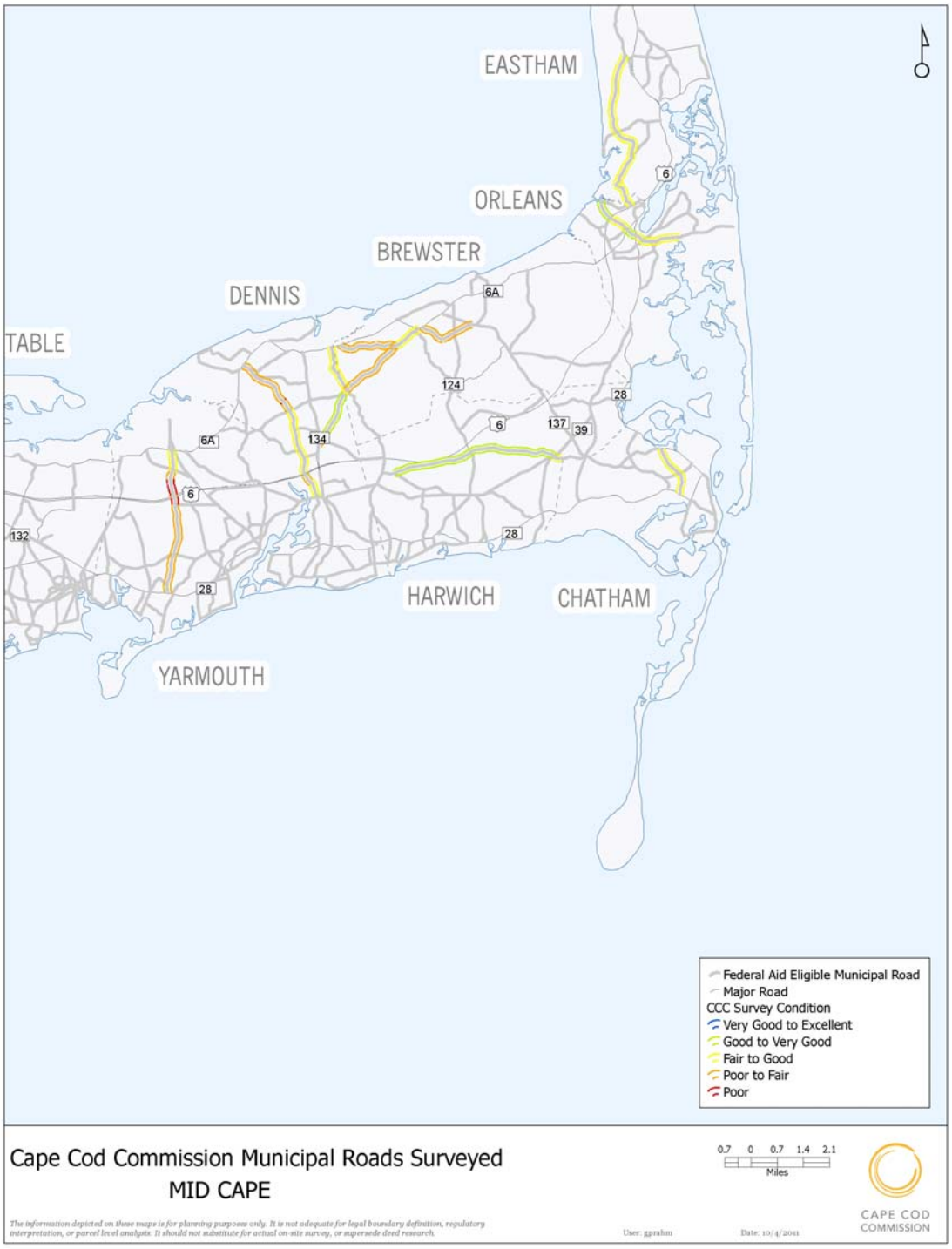

Figure 8 – 2011 CCC Pavement Condition Surveys: Mid-Cape

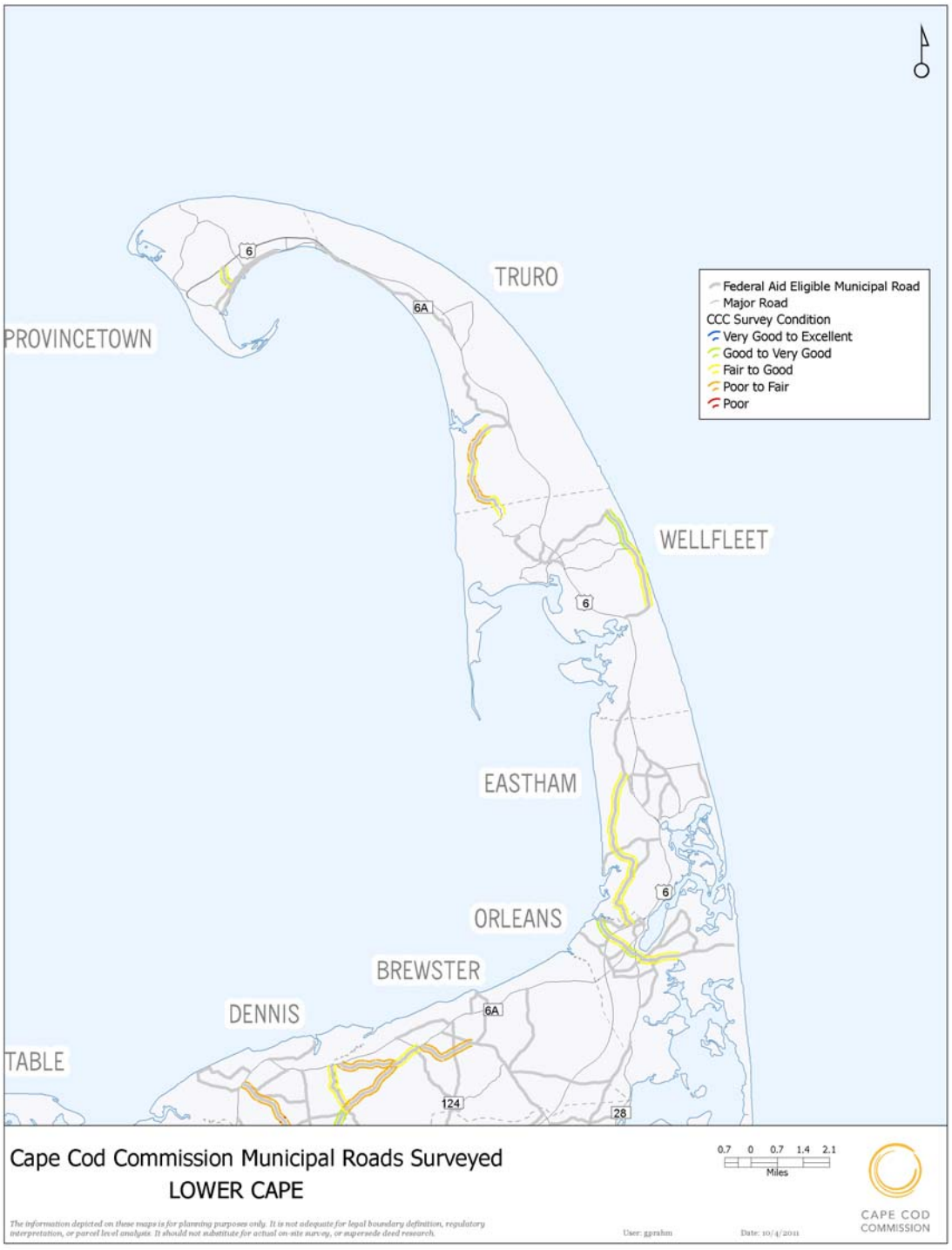

Figure 9 – 2011 CCC Pavement Condition Surveys: Lower Cape

When combined with MassDOT's "Municipal Roads with Evaluation" information, the following figures represent over 145 miles of the County's Municipal Roads. In some cases CCC evaluations were made on sections of roads also evaluated by MassDOT. The figures are presented geographically (Upper Cape, Mid-Cape, and Lower Cape) and show the combined evaluations by colored lines. For MassDOT evaluations, the colors of the thick solid lines range from Blue (Excellent) to Red (Poor). For the CCC evaluations, the colors of the parallel lines range from Blue (Very Good to Excellent) to Red (Poor).

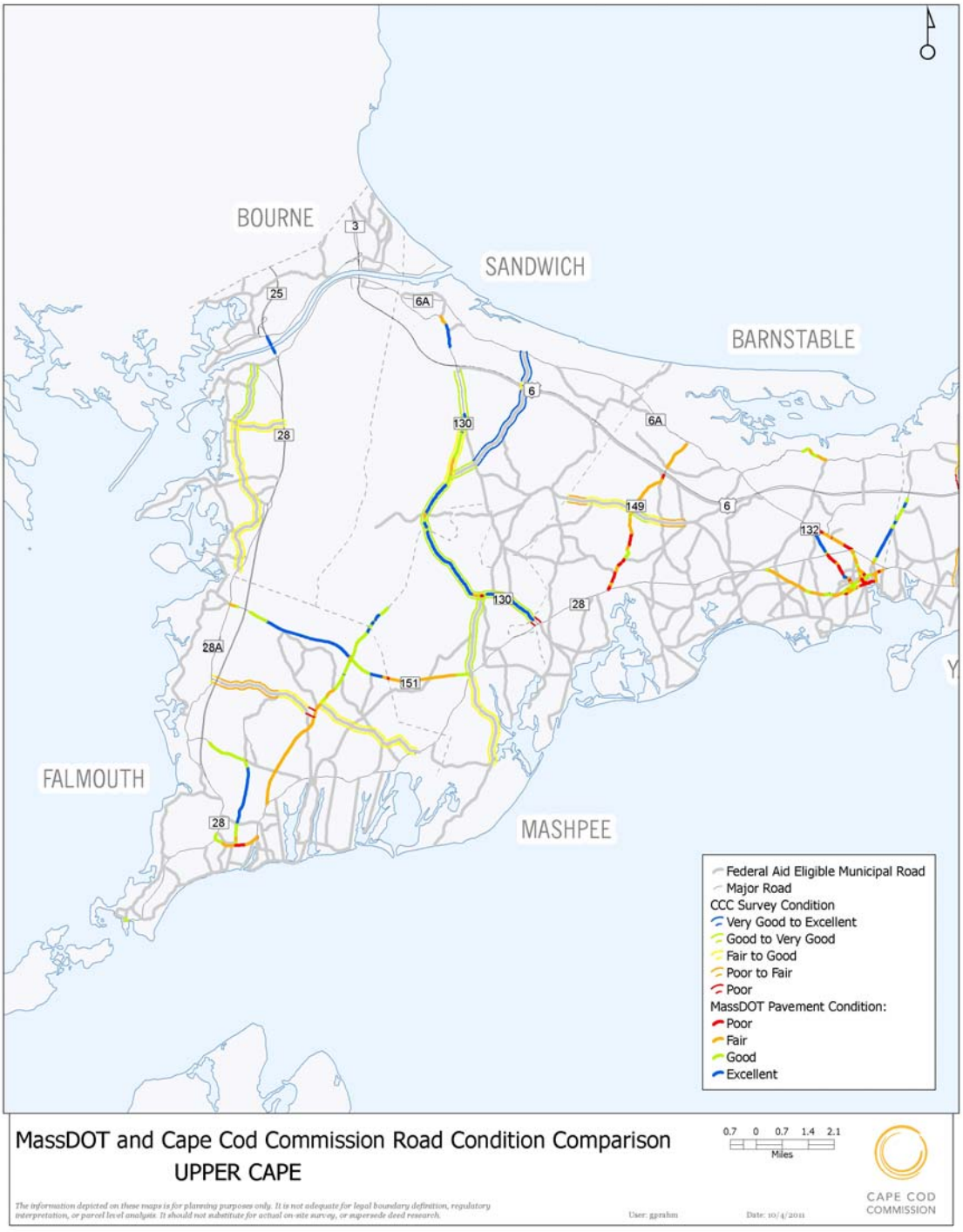

Figure 10 - MassDOT & CCC Evaluations (2006-2011): Upper Cape

Figure 11 - MassDOT & CCC Evaluations (2006-2011): Mid-Cape

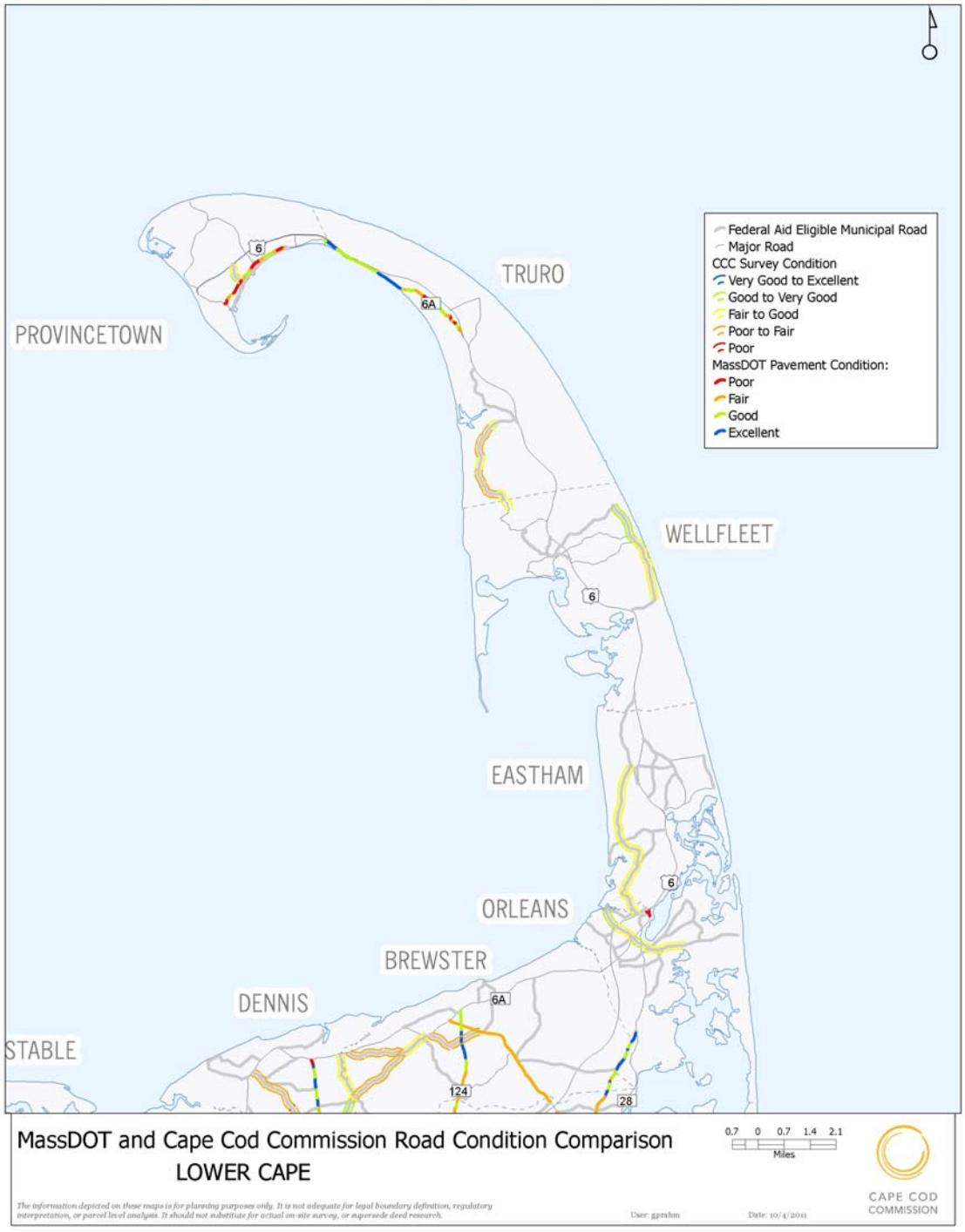

Figure 12 - MassDOT & CCC Evaluations (2006-2011): Lower Cape

1.5.3 CCC EVALUATIONS OF PAVEMENT CONDITIONS – ATR SITES

Starting in mid-summer of 2011, CCC traffic technicians were tasked with collecting pavement condition data as part of their work in setting up Automatic Traffic Recorders (ATRs). This yielded pavement condition data at 96 locations throughout 14 Cape Cod towns. Also, since a 48-hour traffic count was collected from each ATR, results include a pavement condition "weighted" by traffic volume for each town. The weighting method consisted of multiplying the Annual Average Daily Traffic at each location times that locations' observed pavement condition. Then these results were totaled and divided by the sum of Annual Average Daily Traffic from that town's ATR's. Annual Average Daily Traffic is calculated by multiplying the appropriate MassDOT monthly adjustment factor times the observed average daily traffic over the 48 hour ATR data collection period. The following table presents town-wide averages of the pavement condition information collected at ATR sites.

Table 8 - Summary of Pavement Conditions at ATR Sites

TOWN	# of Sites	Avg. AADT	Avg. Condition	Weighted Condition
Barnstable	7	7,050	2.1	2.3
Bourne	13	5,669	3.2	3.4
Brewster	4	8,225	3.8	3.9
Chatham	6	7,200	3.5	3.6
Dennis	2	9,150	3.5	3.4
Eastham	4	2,663	3.3	2.5
Falmouth	13	8,758	3.3	3.2
Harwich	7	6,900	3.6	3.6
Mashpee	6	9,783	3.0	3.2
Orleans	4	7,725	3.3	3.3
Provincetown	3	4,237	4.3	4.8
Sandwich	14	5,114	3.4	3.0
Truro	4	1,765	3.5	3.5
Wellfleet	6	5,192	4.0	4.0
Yarmouth	3	8,700	2.7	3.2

Source: Cape Cod Commission, 2011 Observations

See Table 1 for descriptions of pavement conditions (ranging from “Very Good to Excellent” = 1 to “Poor”=5). Pavement conditions including comments and other ATR data for each of the 96 collection sites are presented in the appendix. The following figures are a graphical display of the individual site data for sections of Cod (Upper Cape, Mid-Cape, and Lower Cape). The pavement condition at each ATR site is shown as a colored circle ranging from Blue (Very Good to Excellent) to Red (Poor).

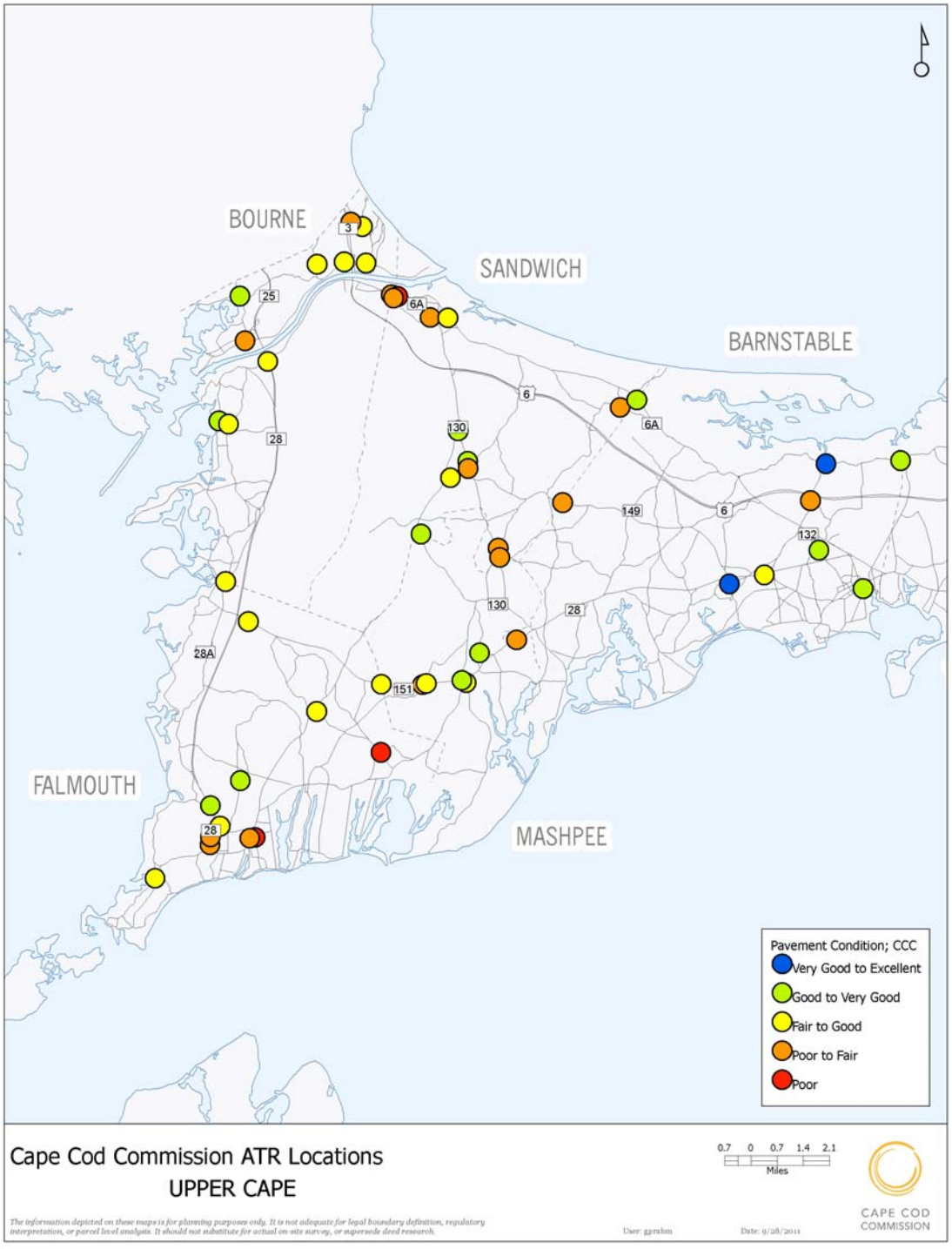

Figure 13 – 2011 Pavement Conditions at ATR Locations: Upper Cape

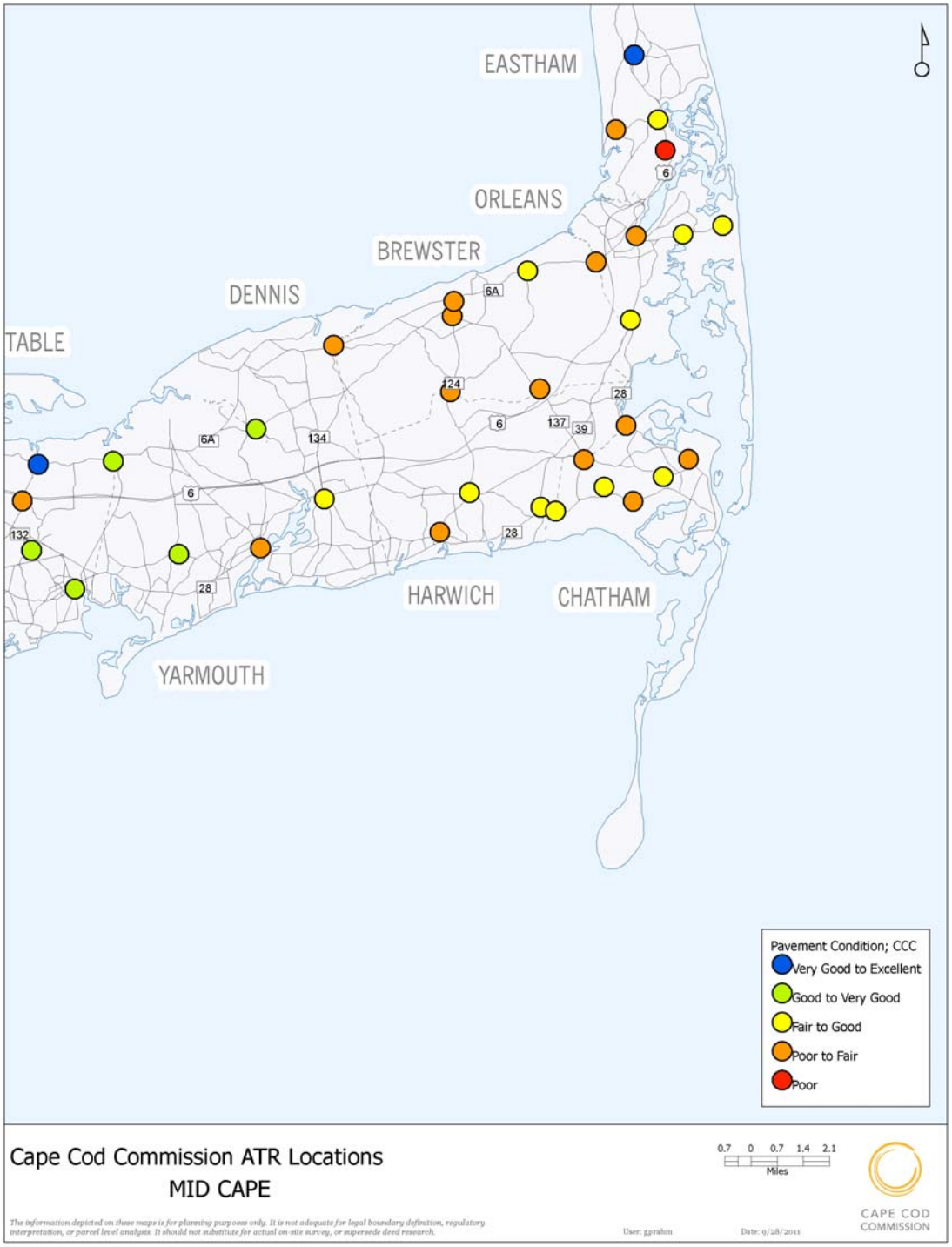

Figure 14 – 2011 Pavement Conditions at ATR Locations: Mid-Cape

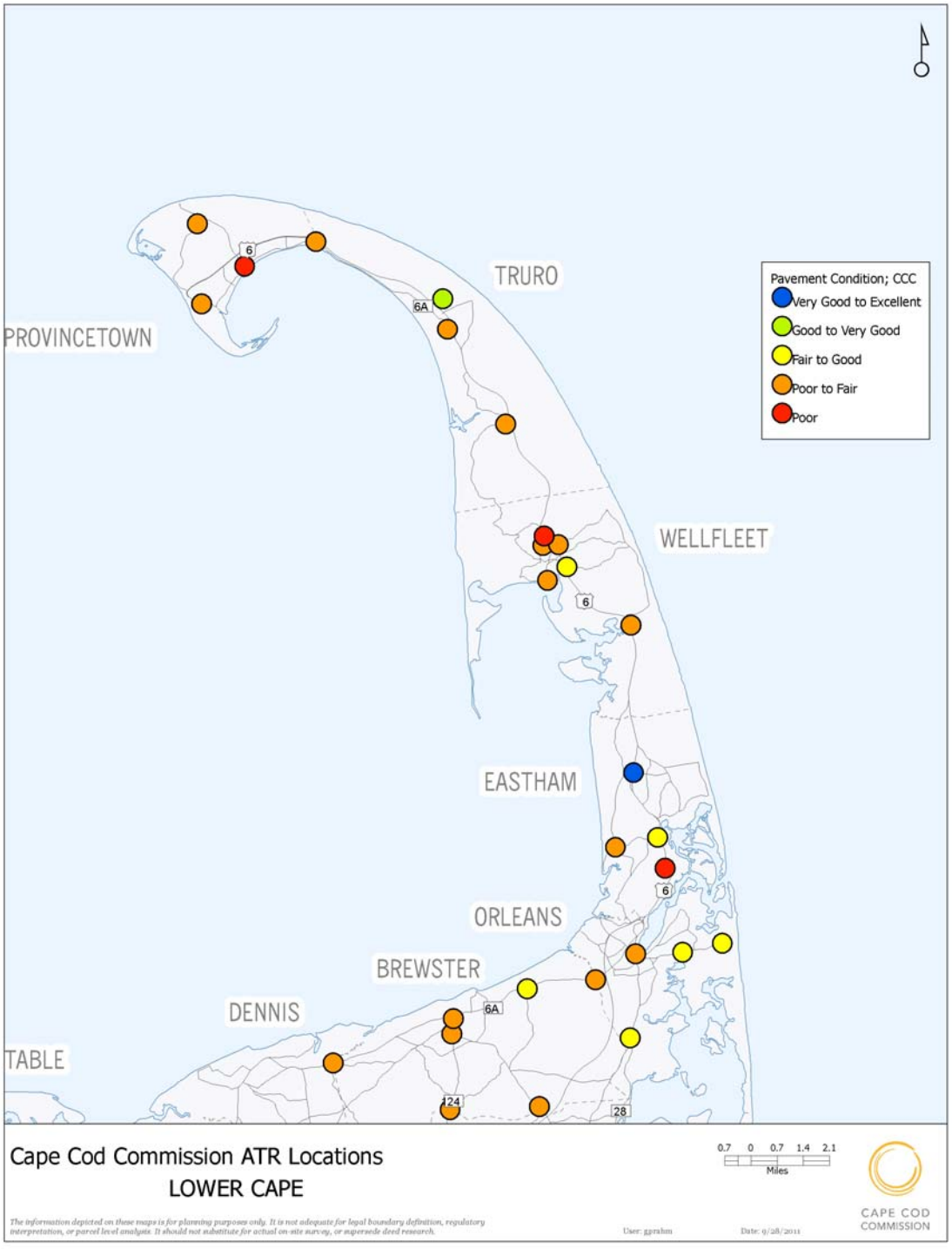

Figure 15 – 2011 Pavement Conditions at ATR Locations: Lower Cape

1.5.4 MUNICIPAL EVALUATIONS OF PAVEMENT CONDITIONS

Several communities have active PMS and have provided examples of pavement condition reporting. Two of these towns (Barnstable and Sandwich) have submitted maps showing roadways with evaluations of pavement conditions. The color-coding is based on the average "Pavement Condition Index" (PCI) as described in Section 1.4.1.1., with the pavement in the best condition (highest PCI) shown in blue and the poorest condition (lowest PCI) shown in red.

The Barnstable and Sandwich PCI maps are presented in the following two figures.

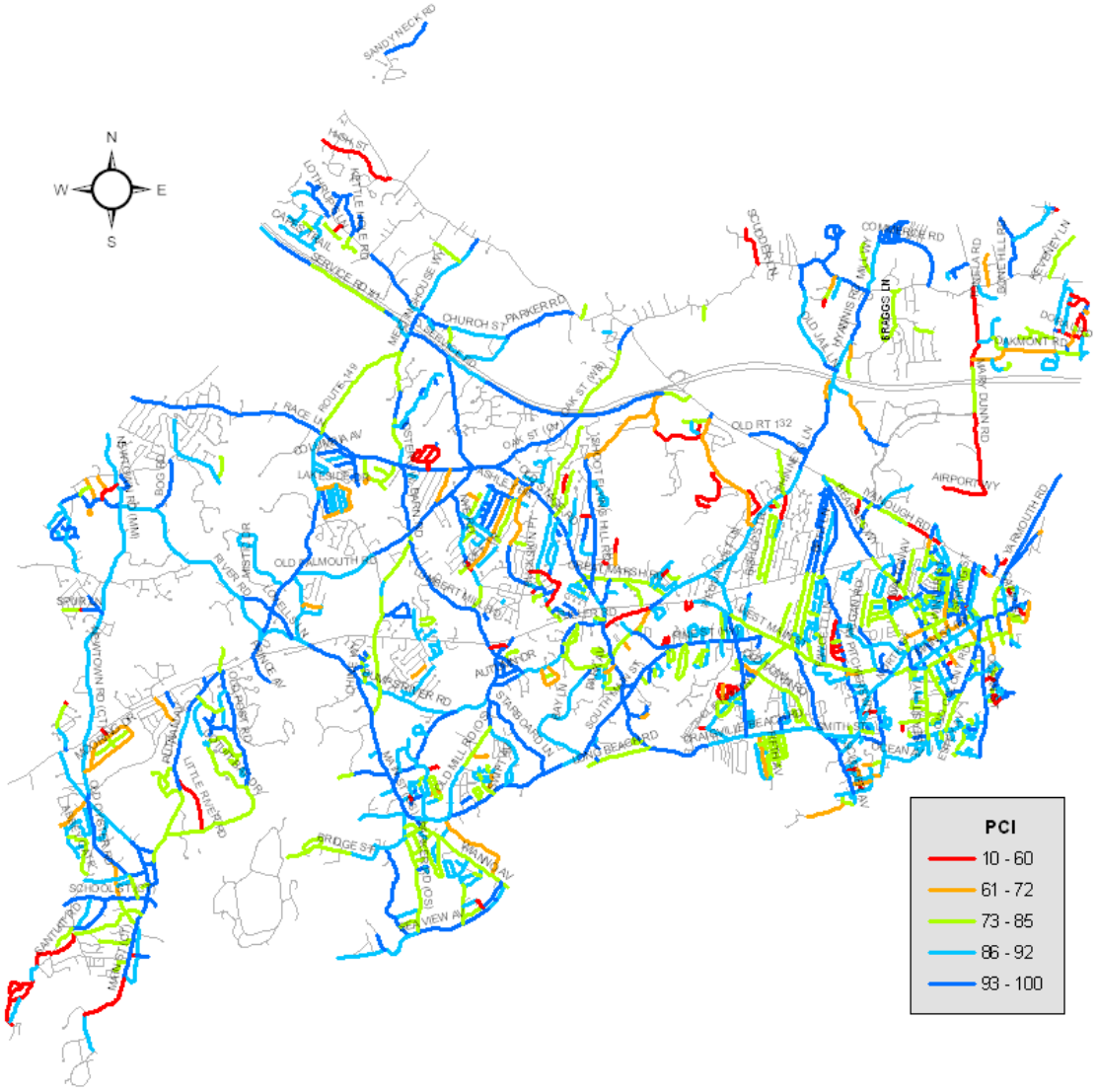

Figure 16 - Barnstable PCI Map

Source: Town of Barnstable/VHB 2009 Data

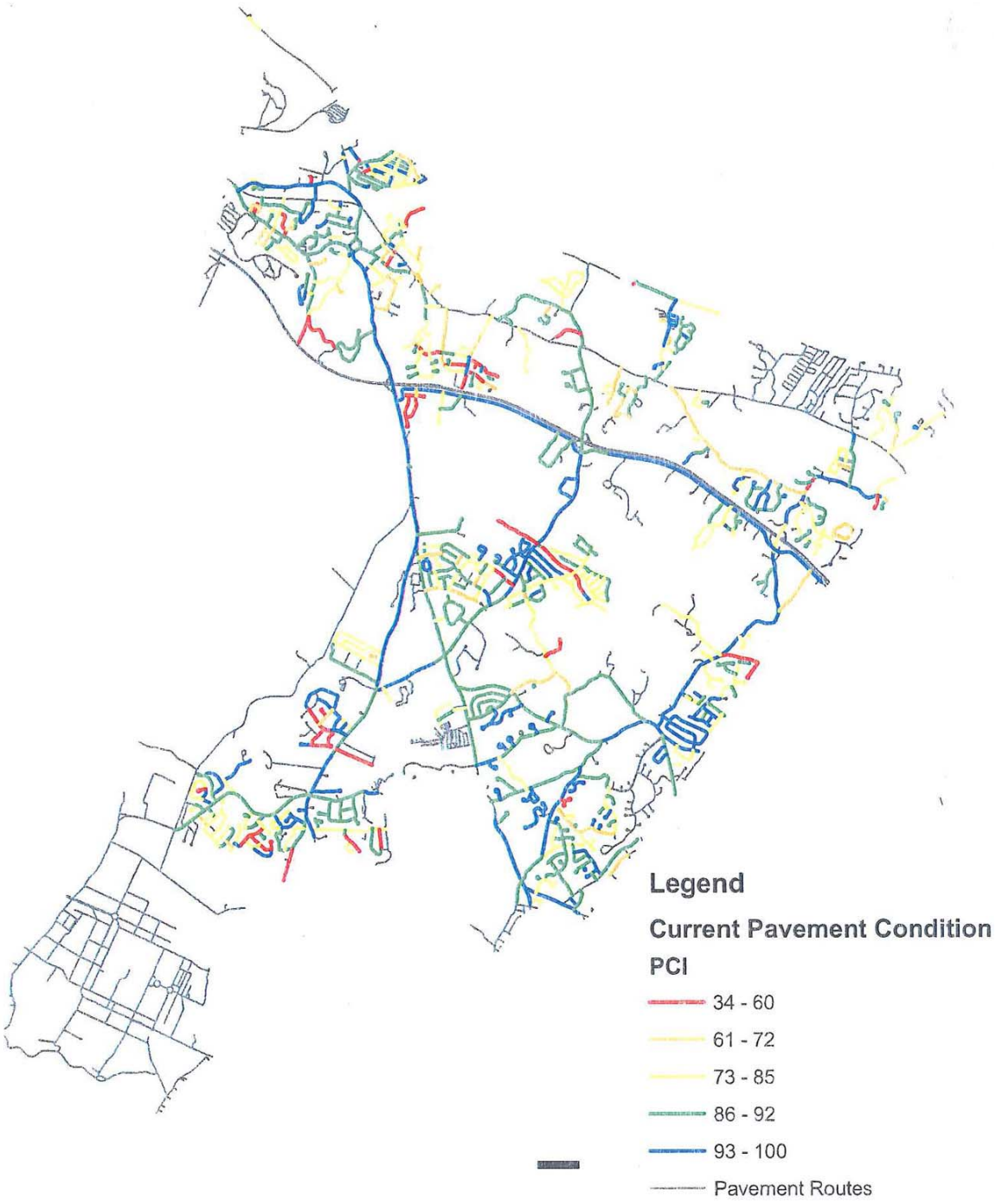

Figure 17 - Sandwich PCI Map

Source: Town of Sandwich/VHB 2005-2006 Data

1.6 RECOMMENDATIONS FOR IMPROVING AVERAGE PAVEMENT CONDITIONS

The Regional Transportation Plan included an initial effort at providing a comprehensive county-wide policy for improved pavement condition. The information in this section was originally published in the 2012 RTP. By considering the additional data collected since the 2012 RTP was finalized, more detailed estimates will be available for implementation – see discussion in the next section of this report.

Based on costs estimated by the Old Colony Planning Council, improving a "Good" road to "Excellent" requires $40,400 per mile; improving from "Fair" requires $405,146 per mile; and improving from "Poor" requires $697,980 per mile. Improving all of Cape Cod's municipally-owned Federal-Aid roadways to "Excellent" requires $118,944,832. While "Excellent" pavement is the ultimate goal of the MPO, this figure is well in excess of the financial constraints outlined in the recently-approved RTP.

A strategy is required to responsibly allocate available funding to maintaining and improving pavement condition on Cape Cod. As can be observed by the costs listed above and also demonstrated in Figure 1, allowing pavement to deteriorate to the lowest condition requires a significantly magnified cost to improve. To get closer to the MPO's ultimate goal, resources spent on improving "Fair" pavement would result in far more miles of resulting "Excellent" pavement than directing resources to "Poor" pavement. Nevertheless, "Poor" pavement cannot be ignored. Therefore, the strategy of the Cape Cod MPO is to evenly divide investment across the lower two categories. Based on expected resources identified in the RTP, the following table lists the resulting totals of each category:

Table 9 - Change in Pavement Condition – RTP Improvement Strategy

Pavement Condition	Base Percent	Base Miles	Improvement Cost	Miles Improved	New Miles	New Percent
Excellent	26.40%	142.87		-	183.32	33.87%
Good	32.96%	178.38		-	178.38	32.96%
Fair	26.36%	142.66	$ 10,367,772	25.59	117.07	21.63%
Poor	14.28%	77.28	$ 10,367,772	14.85	62.43	11.54%
Totals	100.00%	541.19	$ 20,735,545	40.44	541.19	100%

Implementation of this strategy results in overall improvement of pavement quality. The percentage of "Excellent" municipally-owned Federal-Aid roadways increases from 26 to 34 percent. "Good" roadways are maintained at 33%. "Fair" roadways are reduced from 26 to 22%, and "Poor" roadways are reduced from 14 to 12 percent.

1.7 CONCLUSION/RECOMMENDATIONS FOR PMS ENHANCEMENT

During FY 2012, Cape Cod Commission staff will continue advance PMS activities throughout the 15 towns of Barnstable County. Efforts will continue such as:

- One of the main goals of the FY 2012 PMS effort will be to reconcile the various methods used to do pavement evaluations (MassDOT, CCC, various towns'). Further research into the assumptions used by the various agencies and a more comprehensive survey of town efforts will assist in this effort. Ultimately, it is a goal of the Cape Cod Pavement Management program to use information gathered at any level (local, County, State) to make comparisons across the region and assist in identifying local needs through a consistent dataset.

- Identify individual towns' methods for pavement condition evaluation and programming for improvements

- Identify "gaps" in pavement condition information on Municipally-owned Federal Aid eligible roadways – and – prioritize and implement CCC data collection activities on these roadways

- Improve CCC skills in performing pavement evaluations

- Analyze local communities' bid prices to develop Cape-specific improvement costs of various pavement conditions

Appendix: Cape Cod Commission Survey Data

Four communities provided specific responses to the email questionnaire sent by the Cape Cod Commission. Their responses are provided below:

Town of Dennis responses to survey questions:

1. *Do you maintain records of pavement quality on your community's roadways?* - yes
2. *Can you send [electronically preferred] summaries of pavement quality assessments?* - yes, I will follow up with VHB for most recent
3. *What system/method do you use to assess pavement quality?* - VHB, since 1998
4. *Can you send us a report/documentation of methods used?* - yes, I will follow up with VHB
5. *What method do you use to determine repair strategies?* - see above
6. *Do you have estimated costs for implementing various repair strategies?* - we have not had that assessment done for several years
7. *Can you forward us cost estimates sheets?* - same as 6
8. *Do you have a capital plan for pavement improvement?* - Yes, $600,000 per year for "secondary roads" Chapter 90 funds used exclusively for primary roads
9. *Can you forward us a copy of the capital plan?* - attached

Town of Harwich responses to survey questions:

1. *Do you maintain records of pavement quality on your community's roadways?* - Yes, but not via a PCI. We rate roads in 1 of 4 structural conditions: good, fair, deficient, intolerable

2. *Can you send [electronically preferred] summaries of pavement quality assessments?* - See attached Harwich Road Inventory

3. *What system/method do you use to assess pavement quality?* - Internal working knowledge of local road conditions - explained above

4. *Can you send us a report/documentation of methods used?* - No

5. *What method do you use to determine repair strategies?* - We try to balance maintenance with repair in an attempt to avoid costly reconstruction utilizing many different processes and procedures

6. *Do you have estimated costs for implementing various repair strategies?* - Yes, we utilize county bid pricing - see page two of 5 yr road maintenance plan

7. *Can you forward us cost estimates sheets?* - See attached maintenance plan

8. *Do you have a capital plan for pavement improvement?* - Yes

9. *Can you forward us a copy of the capital plan?* - see attached

Town of Sandwich responses to survey questions:

1. *Do you maintain records of pavement quality on your community's roadways?* - Yes

2. *Can you send [electronically preferred] summaries of pavement quality assessments?* - Attached is the following: "All Roads Sorted" - Breaks down pavement management by repair type, pci, benefit, etc.

3. *What system/method do you use to assess pavement quality?* - We have used VHB's Road Manager software for our road inventory.

4. *Can you send us a report/documentation of methods used?* - I have a large "Pavement Management Study Update" that I can let you borrow/copy.

5. *What method do you use to determine repair strategies?* - We mainly use PCI and Benefit.

6. *Do you have estimated costs for implementing various repair strategies?* - We use the County's bid prices and insert these into our own cost estimate spreadsheet

7. *Can you forward us cost estimates sheets?* - Attached is the following: "Final Construction Bids" - Barnstable County Bid prices: "Paving Projects 2011" - We use this for our annual cost estimating using county bid prices.

8. *Do you have a capital plan for pavement improvement?* - Yes

9. *Can you forward us a copy of the capital plan?* - Attached is the following: "2007-2011 Proposed Treatments" - This is generally our 5-Year plan. It changes dramatically year-to-year but gives us a guide to follow as funds become available. We are due for another long term plan; "roadprogrammap" - 5-Year Plan Map

Town of Yarmouth responses to survey questions:

1. *Do you maintain records of pavement quality on your community's roadways?* - Yes

2. *Can you send [electronically preferred] summaries of pavement quality assessments?* - I presume so but with 240 miles of roads and many more road section will be a lot of info.

3. *What system/method do you use to assess pavement quality?* - VHB, Road Manager

4. *Can you send us a report/documentation of methods used?* - Need more info on what you mean

5. *What method do you use to determine repair strategies?* - We review after initial list is generated and decide on chip seal, double chip seal or overlay. Main drags get rubber chip or overlay

6. *Do you have estimated costs for implementing various repair strategies?* - yes

7. *Can you forward us cost estimates sheets?* - When Town Engineer returns PT to work as he retired in August

8. *Do you have a capital plan for pavement improvement?* - Annually we spend $1.3-1.5 million on roadway maintenance

Appendix: Cape Cod Commission Survey Data

Cape Cod Commission - Pavement Condition Surveys

Town Barnstable
Road Race Ln
Beginning_Ending Sandwich TL to Old Stage Rd
Date 9/11/2011 **Observer** PNWL

Windshield Surveys

Condition	Comment	Transition
○1 ○2 ◉3 ○4 ○5	minor linear crack	Trotters Ln
○1 ○2 ○3 ◉4 ○5	serious wear, utility pathc	Mill Race Rd
○1 ○2 ◉3 ○4 ○5	wear	Rt 149
○1 ◉2 ○3 ○4 ○5	better here	Evergreen
○1 ○2 ◉3 ○4 ○5	more wear & crack sealing (linear)	Osterville-W.Barnstable Rd
○1 ○2 ○3 ◉4 ○5	more wear & minor linear cracking	Old Stage Rd
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

printed: 9/22/2011

Cape Cod Commission - Pavement Condition Surveys

Windshield Surveys

Town	Bourne
Road	County Rd
Beginning_Ending	Trowbridge Rd to Rt 28A
Date	6/30/2011
Observer	GDC

Condition	Comment	Transition
○1 ◉2 ○3 ○4 ○5		500 ft. N of Clay Pond Rd
○1 ○2 ◉3 ○4 ○5	cracking	Rt 28A
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

printed: 9/22/2011

Cape Cod Commission - Pavement Condition Surveys

Town Bourne

Road Clay Pond Rd

Beginning_Ending Rt 28 to County Rd

Date 7/15/2011 **Observer** GDC

Windshield Surveys

Condition	Comment	Transition
○1 ○2 ◉3 ○4 ○5	cracking	
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

printed: 9/22/2011

Cape Cod Commission - Pavement Condition Surveys

Town Brewster
Road Setucket Rd & Stony Brook Rd (E)
Beginning_Ending Dennis TL to Rt 6A
Date 9/9/2011 **Observer** LAM

Windshield Surveys

Condition	Comment	Transition
○1 ○2 ○3 ◉4 ○5	lots of crack sealing, unrepired oles, occasional crasking	Stony Brook Rd (mile 2.0)
○1 ○2 ◉3 ○4 ○5	large patches, crack seal	Rt 6A (mile 2.8)
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

printed: 9/22/2011

Cape Cod Commission - Pavement Condition Surveys

Town Brewster
Road Tubman Rd
Beginning_Ending Rt 6A to Rt 137
Date 9/19/2011 **Observer** LAM

Windshield Surveys

Condition	Comment	Transition
○1 ○2 ○3 ◉4 ○5	crack seal, wear, rutting, occ. patches	Rt 124
○1 ○2 ○3 ◉4 ○5	wear, crack seal, transverse cracking, patches	Rt 137 (1.5 mi)
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

printed: 9/22/2011

Cape Cod Commission - Pavement Condition Surveys

Town Brewster

Road Stony Brook Rd (W)

Beginning_Ending Rt 6A (W) to Setucket Rd

Date 9/19/2011 **Observer** LAM

Windshield Surveys

Condition	Comment	Transition
○1 ○2 ○3 ◉4 ○5	cracks, edge raveling, wear	A.P. Newcomb Rd (0.9 mi)
○1 ○2 ○3 ◉4 ○5	wheelpath cracking, wear, edge raveling	Setucket Rd (1.5 mi)
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

printed: 9/22/2011

Cape Cod Commission - Pavement Condition Surveys

Windshield Surveys

Town	Chatham
Road	Crowell Rd
Beginning_Ending	Rt 28 (N) to Rt 28 (W)
Date	9/9/2011
Observer	LAM

Condition	Comment	Transition
○1 ○2 ◉3 ○4 ○5	occasional patches, minor cracking	Rt 28 (mile 1.4)
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

printed: 9/22/2011

Cape Cod Commission - Pavement Condition Surveys

Town Dennis
Road Old Bass River Rd
Beginning_Ending Highbank Rd to Rt 6A
Date 9/11/2011 **Observer** PNWL

Windshield Surveys

Condition	Comment	Transition
○1 ○2 ◉3 ○4 ○5	more wear, no cracks	Town Hall
○1 ○2 ◉3 ○4 ○5	wear still no cracks	begin Old Bass River, for w/Main (mile 1)
○1 ○2 ○3 ◉4 ○5	stress, dark patches leaner at bridge ends	bridge
○1 ○2 ◉3 ○4 ○5	some unevenness	Bob Crowell Rd
○1 ○2 ◉3 ○4 ○5	dips near drainage catch basins	291 Old Bass River Rd
○1 ○2 ◉3 ○4 ○5	wear	Old Chatham Rd
○1 ○2 ◉3 ○4 ○5	patch sinking, transversal (across width of roadway, utility?)	(mile 3)
○1 ○2 ○3 ◉4 ○5	rutting - bumpy section	Phyllis Dr
○1 ○2 ○3 ◉4 ○5	transversal cracking	Capt Walsh Rd + 150 ft
○1 ○2 ○3 ○4 ◉5	transversal cracking in parallel path NB side	150 ft before Blackberry Ln
○1 ○2 ○3 ◉4 ○5	transversal & linear cracking at seam	Blackberry Ln
○1 ○2 ○3 ◉4 ○5	utility patch failing	Rema's Way
○1 ○2 ○3 ◉4 ○5	wear	Rt 6A (mile 5)
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

printed: 9/22/2011

Cape Cod Commission - Pavement Condition Surveys

Town Dennis
Road Airline Rd
Beginning_Ending Rt 134 to Rt 6A
Date 9/19/2011 **Observer** LAM

Windshield Surveys

Condition	Comment	Transition
○1 ○2 ○3 ◉4 ○5	potholes, a lot of crack seal	Old Chatham Rd
○1 ◉2 ○3 ○4 ○5	rare patch	200' before Setucket
○1 ○2 ◉3 ○4 ○5	crack seal	Setucket Rd (W)
○1 ○2 ○3 ○4 ○5	(Gap for Setucket Road)	
○1 ○2 ◉3 ○4 ○5	long. cracks, minor edge ravel, patches, wear	from Setucket (E) to Rt 6A (2.9 mi)
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

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Cape Cod Commission - Pavement Condition Surveys

Windshield Surveys

Town	Eastham
Road	Bridge Rd & Herring Brook Rd
Beginning_Ending	Rock Harbor Rd to Massasoit Rd
Date	9/21/2011
Observer	BCS

Condition	Comment	Transition
○1 ○2 ◉3 ○4 ○5	crack sealing - old, fair	Boat Meadow Rd
○1 ○2 ◉3 ○4 ○5	good	Herring Brook Rd
○1 ○2 ◉3 ○4 ○5	good	Cole Rd
○1 ○2 ◉3 ○4 ○5	good	Field Rd
○1 ○2 ◉3 ○4 ○5	good	Oak/Massasoit
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

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Cape Cod Commission - Pavement Condition Surveys

Town Falmouth
Road Thomas Landers Rd
Beginning_Ending Sandwich Rd to Rt 28A
Date 9/12/2011 **Observer** LAM

Windshield Surveys

Condition	Comment	Transition
○1 ○2 ○3 ○4 ◉5	Lots of Crack seal, edge cracking, potholes	Turner Rd (0.2 mile)
○1 ○2 ◉3 ○4 ○5	Crack seal, occasional patch	Blacksmith Shop Rd
○1 ○2 ○3 ◉4 ○5	cracks, crack sealing poth holes	Technology Park Dr
○1 ○2 ○3 ◉4 ○5	crack seal, rutting, potholes	Rt 28
○1 ○2 ◉3 ○4 ○5	minor cracking	Rt 28A (mile 3.0)
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

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Cape Cod Commission - Pavement Condition Surveys

Windshield Surveys

Town	Falmouth
Road	Carriage Shop Rd
Beginning_Ending	Metoxit Rd to Sandwich Rd
Date	9/12/2011
Observer	LAM

Condition	Comment	Transition
○1 ○2 ◉3 ○4 ○5	crack seal; occ: filled pothole, edge cracking, transverse; minor rutting	Sandwich Rd (mile 3.1)
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

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Cape Cod Commission - Pavement Condition Surveys

Town Harwich
Road Queen Anne Rd
Beginning_Ending Chatham TL to Main St (N.W. Harwich)
Date 9/9/2011 **Observer** LAM

Windshield Surveys

Condition	Comment	Transition
○1 ○2 ◉3 ○4 ○5	occasiona pathces, minor cracking, crack sealing	Rt 39 (mile 0.8)
○1 ◉2 ○3 ○4 ○5	rare patch	Rt 124 (mile 3.1)
○1 ◉2 ○3 ○4 ○5	rare patch	Main St (mile 5.3)
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

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Cape Cod Commission - Pavement Condition Surveys

Windshield Surveys

Town	Mashpee
Road	Great Neck Rd N
Beginning_Ending	Rt 130 to Mashpee Rotary
Date	8/10/2011
Observer	GDC

Condition	Comment	Transition
○1 ◉2 ○3 ○4 ○5		Mashpee Rotary
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

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Cape Cod Commission - Pavement Condition Surveys

Windshield Surveys

Town	Mashpee
Road	Great Neck Rd S
Beginning_Ending	Mashpee Rotary to Red Brook Rd
Date	8/10/2011
Observer	GDC

Condition	Comment	Transition
○1 ○2 ◉3 ○4 ○5	Cracking	Red Brook Rd
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

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Cape Cod Commission - Pavement Condition Surveys

Town Orleans
Road Rock Harbor Rd & Main St
Beginning_Ending Rock Harbor to Beach Rd
Date 9/9/2011 **Observer** LAM

Windshield Surveys

Condition	Comment	Transition
○1 ◉2 ○3 ○4 ○5	first 50' fair near Rock Harbor	Rt 6 (mile 0.5)
○1 ○2 ◉3 ○4 ○5	crack sealing	Locust Rd (mile 0.8)
○1 ○2 ◉3 ○4 ○5	wear near Rt 6A intersection	Rt 6A
○1 ◉2 ○3 ○4 ○5		Rt 28 (mile 1.4)
○1 ○2 ◉3 ○4 ○5	minor rutting, patches	Tonset Rd
○1 ○2 ◉3 ○4 ○5	crack sealing	Beach Rd/Barley Neck Rd (mile 2.6)
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

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Cape Cod Commission - Pavement Condition Surveys

Windshield Surveys

Town	Provincetown
Road	Shank Painter Rd
Beginning_Ending	Rt 6 to Bradford St (Rt 6A)
Date	9/16/2011
Observer	BCS

Condition	Comment	Transition
○1 ○2 ◉3 ○4 ○5	poor ride quality / patches	Stop & Shop
○1 ◉2 ○3 ○4 ○5		Police Station
○1 ○2 ○3 ◉4 ○5	some failed pavement	at Police Station
○1 ○2 ◉3 ○4 ○5	better ride quality	Bradford St
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

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Cape Cod Commission - Pavement Condition Surveys

Windshield Surveys

Town	Sandwich
Road	Quaker Meeting House Rd
Beginning_Ending	Rt 130 to Rt 6A
Date	9/16/2011
Observer	GDC

Condition	Comment	Transition
○1 ◉2 ○3 ○4 ○5		Cotuit Rd
◉1 ○2 ○3 ○4 ○5		Chapaquoit Rd
◉1 ○2 ○3 ○4 ○5		Service Rd
○1 ○2 ◉3 ○4 ○5		N of Rt 6 WB Ramps
◉1 ○2 ○3 ○4 ○5		Rt 6A
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

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Cape Cod Commission - Pavement Condition Surveys

Windshield Surveys

Town	Sandwich/Mashpee/Barnstable
Road	Rt 130
Beginning_Ending	Rt 6 Ramps to Rt 28
Date	7/19/2011
Observer	GDC

Condition	Comment	Transition
○1 ◉2 ○3 ○4 ○5		500' S of Cotuit Rd
○1 ○2 ◉3 ○4 ○5		500' S of Quaker Meetinghouse Rd
○1 ◉2 ○3 ○4 ○5		Mashpee/Barnstable TL
○1 ○2 ○3 ○4 ◉5		Rt 28
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

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Cape Cod Commission - Pavement Condition Surveys

Windshield Surveys

Town	Truro & Wellfleet
Road	Old County Rd
Beginning_Ending	Pamet Point Rd (Wellfleet) to Depot St (Truro)
Date	9/21/2011
Observer	BCS

Condition	Comment	Transition
○1 ○2 ◉3 ○4 ○5	fair, unsealed cracks	Pamet Pt (0.6 mi)
○1 ○2 ○3 ◉4 ○5	alligator cracks, fair	(1.1 mi)
○1 ○2 ◉3 ○4 ○5	fair	(1.8 mi)
○1 ○2 ○3 ◉4 ○5	fair	(2.8 mi)
○1 ○2 ◉3 ○4 ○5	good	Depot St (3.0 mi)
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

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Cape Cod Commission - Pavement Condition Surveys

Windshield Surveys

Town	Wellfleet
Road	Ocean View Dr
Beginning_Ending	Lecount Hollow Dr to Gross Hill Rd
Date	9/21/2011
Observer	BCS

Condition	Comment	Transition
○1 ○2 ◉3 ○4 ○5	fair - patches & ride quality poor	(0.9 mi)
○1 ○2 ◉3 ○4 ○5	good	Cahoon Hollow Rd
○1 ◉2 ○3 ○4 ○5	good, some crack repairs	Gross Hill Rd
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

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Cape Cod Commission - Pavement Condition Surveys

Windshield Surveys

Town	Yarmouth
Road	West Yarmouth Rd
Beginning_Ending	Rt 6A to Rt 28
Date	9/11/2011
Observer	PNWL

Condition	Comment	Transition
○1 ○2 ◉3 ○4 ○5	middle of lanes more wear	White Rock Rd
○1 ○2 ◉3 ○4 ○5	Wear w/short leanear crack near lane seam	Devonshire Ln
○1 ○2 ○3 ◉4 ○5	cracking	RR xing
○1 ○2 ○3 ○4 ◉5	wear, humps - transversal, ravelling & crack sealing	before hwy bridges
○1 ○2 ○3 ◉4 ○5	wear but not cracks	after hwy bridges
○1 ○2 ○3 ○4 ◉5	wear, raveling	Old Townhouse Rd
○1 ○2 ○3 ◉4 ○5	wear, util. pathc repair sunken slightly	Buck Island Rd
○1 ○2 ○3 ◉4 ○5	wear (potholes at Rt 28)	Rt 28
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		
○1 ○2 ○3 ○4 ○5		

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Appendix: Cape Cod Commission ATR Location Data

Cape Cod Pavement Management System - ATR Locations

TOWN	ROUTE & LOCATION	Begin Date: / End Date:	ADT / AADT	Pavement Conditions
Barnstable & Yarmouth	Rt 6A @ Barn/Yarm TL Site Code: 20338 X -70.2603 Y 41.7013	7/11/2011 7/13/2011	12,790 9,700	2 Good to Very Good
Barnstable	Rt 6A E of Hyannis Rd Site Code: 7132 X -70.2990 Y 41.7004	7/11/2011 7/13/2011	7,914 6,000	1 New
Barnstable	Bearses Way N of Enterprise Rd Site Code: 7336 X -70.3033 Y 41.6670	7/11/2011 7/13/2011	11,516 8,800	2 Good to Very Good possible longitudinal crack, good
Barnstable	Old Colony N of South St Site Code: 7193 X -70.2808 Y 41.6518	8/9/2011 8/11/2011	9,223 7,000	2 Good to Very Good
Barnstable	Old Post Rd E of Old Stage Rd Site Code: 7195 X -70.3500 Y 41.6545	8/9/2011 8/11/2011	992 750	1 New
Barnstable	Phinneys Ln S of Kidds Hill Rd Site Code: 20837 X -70.3075 Y 41.6863	7/11/2011 7/13/2011	8,436 6,400	4 Poor to Fair Fair, cracking around drainpipe/manhole, longitudinal cracking
Barnstable	West Main St S of Rt 28 Site Code: 20348 X -70.3317 Y 41.6576	7/11/2011 7/13/2011	14,114 10,700	3 Fair to Good small cracks, slight rutting
Bourne & Falmouth	Rt 28A @ Bour/Falm TL Site Code: 20123 X -70.6107 Y 41.6577	7/18/2011 7/20/2011	10,368 7,900	3 Fair to Good Repairs are ok, some longitudinal cracking, and rutting
Bourne & Plymouth	Rt 3A S of Bour/Plym TL Site Code: 20125 X -70.5439 Y 41.7966	7/18/2011 7/20/2011	8,098 6,200	4 Poor to Fair Longitudinal, transverse, edge, and alligator cracking
Bourne & Plymouth	Rt 3A S of Bour/Plym TL Site Code: 20125 X -70.5439 Y 41.7966	7/12/2011 7/14/2011	7,846 6,000	4 Poor to Fair transverse, longitudinal, edge, and alligator cracking

TOWN	ROUTE & LOCATION	Begin Date: / End Date:	ADT / AADT	Pavement Conditions
Bourne Site Code: 7175	**Rt 6&28** **W of Belmont Circle** X -70.5993 Y 41.7510	**7/6/2011** **7/8/2011**	**20,016** **15,200**	4 Poor to Fair Transverse, longitudinal, and edge cracking
Bourne **& Sandwich** Site Code: 20133	**Rt 6A** **@ Bour/Sand TL** X -70.5233 Y 41.7682	**7/18/2011** **7/20/2011**	**13,607** **10,300**	4 Poor to Fair Transverse cracking, rutting, and crumbling at edges
Bourne Site Code: 20814	**Church Ln** **N of Rt 6 Scenic** X -70.5475 Y 41.7813	**7/12/2011** **7/14/2011**	**2,072** **1,600**	3 Fair to Good slight cracking, good
Bourne Site Code: 20930	**County Rd** **N of Clay Pond Rd** X -70.6082 Y 41.7189	**7/18/2011** **7/20/2011**	**3,748** **2,800**	3 Fair to Good Some minor cracking, repairs are good besides this
Bourne Site Code: 20113	**Head of the Bay Rd** **E of Plymouth Ln** X -70.6016 Y 41.7684	**7/12/2011** **7/14/2011**	**4,682** **3,600**	2 Good to Very Good
Bourne Site Code: 20769	**Herring Pond Rd** **N of Bournedale Rd** X -70.5615 Y 41.7804	**7/12/2011** **7/14/2011**	**2,264** **1,700**	3 Fair to Good longitudinal cracking
Bourne Site Code: 20115	**Meetinghouse Ln** **W of Old Plymouth Rd** X -70.5360 Y 41.7806	**7/12/2011** **7/14/2011**	**7,602** **5,800**	3 Fair to Good some longitudinal cracking, but cracks are all covered; one patch but in good condition
Bourne Site Code: 7121	**Old Plymouth Rd** **S of Norris Rd** X -70.5380 Y 41.7948	**7/6/2011** **7/8/2011**	**4,006** **3,000**	3 Fair to Good Edge cracking
Bourne Site Code: 7120	**Shore Rd** **N of Beach St** X -70.6134 Y 41.7200	**7/6/2011** **7/8/2011**	**5,515** **4,200**	2 Good to Very Good
Bourne Site Code: 20141	**Trowbridge Rd** **W of Bourne Rotary** X -70.5876 Y 41.7429	**7/18/2011** **7/20/2011**	**7,159** **5,400**	3 Fair to Good Some minor cracking, repairs look good besides this

TOWN	ROUTE & LOCATION	Begin Date: / End Date:	ADT / AADT	Pavement Conditions
Brewster Site Code: 7142	**Rt 137** **W of Rt 124** X -70.0835 Y 41.7554	**8/1/2011** **8/3/2011**	**3,755** **2,900**	4 Poor to Fair Transverse, longitudinal, and alligator cracking
Brewster **& Orleans** Site Code: 20584	**Rt 6A** **@ Brew/Orle TL** X -70.0084 Y 41.7754	**8/3/2011** **8/5/2011**	**19,249** **14,600**	4 Poor to Fair Severe longitudinal, edge, and transverse cracking
Brewster Site Code: 20586	**Rt 6A** **E of Rt 124** X -70.0825 Y 41.7613	**8/1/2011** **8/3/2011**	**15,023** **11,400**	4 Poor to Fair Deep rutting, longitudinal and transverse cracking
Brewster Site Code: 7144	**Millstone Rd** **S of Rt 6A** X -70.0440 Y 41.7725	**8/3/2011** **8/5/2011**	**5,315** **4,000**	3 Fair to Good Minor edge cracking, otherwise repairs holding
Chatham Site Code: 20555	**Rt 137** **S of Queen Anne Rd** X -70.0165 Y 41.6988	**7/19/2011** **7/21/2011**	**10,076** **7,700**	4 Poor to Fair Block, edge, transverse, & longitudinal cracking; mild rutting
Chatham Site Code: 20557	**Rt 28** **E of Barn Hill Rd** X -69.9913 Y 41.6825	**7/19/2011** **7/21/2011**	**15,589** **11,800**	4 Poor to Fair Severe transverse cracking, pothole, major patching (in good condition), deep rutting
Chatham Site Code: 20564	**Rt 28** **W of Stoney Hill Rd** X -69.9623 Y 41.6982	**8/8/2011** **8/10/2011**	**10,642** **8,100**	4 Poor to Fair edge, longitudinal cracking; severe rutting
Chatham Site Code: 20564	**Rt 28** **W of Stoney Hill Rd** X -69.9623 Y 41.6982	**7/19/2011** **7/21/2011**	**10,375** **7,900**	3 Fair to Good mild longitudinal, transverse, edge cracking, deep rutting
Chatham Site Code: 20550	**Old Queen Anne Rd** **N of Stepping Stones /Earles/Wilford** X -69.9757 Y 41.6916	**7/19/2011** **7/21/2011**	**7,558** **5,700**	3 Fair to Good patching, slight cracking
Chatham Site Code: 20791	**Sam Ryder Rd** **N of Middle Rd** X -70.0062 Y 41.6881	**7/19/2011** **7/21/2011**	**2,690** **2,000**	3 Fair to Good repairs are holding together

TOWN	ROUTE & LOCATION	Begin Date: / End Date:	ADT / AADT	Pavement Conditions
Dennis Site Code: 20454	**Rt 134** **S of Upper County Rd** X -70.1512 Y 41.6853	**7/13/2011** **7/15/2011**	**15,534** **11,800**	3 Fair to Good repairs are holding, small cracks exist
Dennis **& Brewster** Site Code: 20460	**Rt 6A** **@ Denn/Brew TL** X -70.1452 Y 41.7448	**7/13/2011** **7/15/2011**	**8,525** **6,500**	4 Poor to Fair longitudinal, transverse, block, and alligator cracking; deep rutting in the Brewster section
Eastham Site Code: 20638	**Brackett Rd** **E of Rt 6** X -69.9869 Y 41.8555	**8/8/2011** **8/10/2011**	**5,379** **4,100**	1 New
Eastham Site Code: 20641	**Governor Prence Rd** **W of Rt 6** X -69.9713 Y 41.8183	**8/8/2011** **8/10/2011**	**329** **250**	5 Poor All types of cracking; severe block cracking
Eastham Site Code: 20644	**Herring Brook Rd** **N of Samoset Rd** X -69.9969 Y 41.8266	**8/8/2011** **8/10/2011**	**3,855** **2,900**	4 Poor to Fair transverse, edge, & longitudinal cracking
Eastham Site Code: 20657	**Samoset Rd** **W of Rt 6** X -69.9750 Y 41.8302	**8/8/2011** **8/10/2011**	**4,458** **3,400**	3 Fair to Good minor longitudinal cracking, patched
Falmouth **& Mashpee** Site Code: 20205	**Rt 151** **@ Falm/Mash TL** X -70.5306 Y 41.6171	**7/27/2011** **7/29/2011**	**21,830** **16,600**	3 Fair to Good severe rutting, repairs holding up
Falmouth Site Code: 20206	**Rt 151** **E of Rt 28** X -70.5992 Y 41.6421	**7/18/2011** **7/20/2011**	**21,080** **16,000**	3 Fair to Good Repairs are in good shape
Falmouth Site Code: 20217	**Rt 28** **N of Lakeview Av** X -70.6198 Y 41.5585	**7/20/2011** **7/22/2011**	**18,104** **13,800**	4 Poor to Fair Longitudinal and block cracking
Falmouth Site Code: 20844	**Rt 28** **E of Spring Bars Rd** X -70.5997 Y 41.5578	**7/20/2011** **7/22/2011**	**19,878** **15,100**	4 Poor to Fair Block, transverse, and longitudinal cracking

TOWN	ROUTE & LOCATION	Begin Date: / End Date:	ADT / AADT	Pavement Conditions
Falmouth Site Code: 20190	**Carriage Shop Rd** **E of Sandwich Rd** X -70.5644 Y 41.6068	**8/9/2011** **8/11/2011**	**4,856** **3,700**	3 Fair to Good Some cracking, all patched
Falmouth Site Code: 7214	**Cross Rd** **S of Carriage Shop Rd** X -70.5313 Y 41.5906	**7/27/2011** **7/29/2011**	**743** **560**	5 Poor longitudinal, transverse, & severe alligator cracking. Potholes, failing patches
Falmouth Site Code: 7125	**Gifford St** **S of Brick Kiln Rd** X -70.6042 Y 41.5802	**8/9/2011** **8/11/2011**	**11,391** **8,700**	2 Good to Very Good
Falmouth Site Code: 7125	**Gifford St** **S of Brick Kiln Rd** X -70.6042 Y 41.5802	**7/18/2011** **7/20/2011**	**10,595** **8,100**	2 Good to Very Good
Falmouth Site Code: 7216	**Jones Rd** **Btwn Rt 28 & Beacon St** X -70.6149 Y 41.5627	**7/20/2011** **7/22/2011**	**15,622** **11,900**	3 Fair to Good Repairs in good shape
Falmouth Site Code: 20200	**Palmer Av** **W of Hewins St** X -70.6202 Y 41.5555	**7/20/2011** **7/22/2011**	**6,182** **4,700**	4 Poor to Fair transverse, longitudinal, and alligator cracking
Falmouth Site Code: 7127	**Palmer Av** **W of Rt 28** X -70.6197 Y 41.5707	**7/20/2011** **7/22/2011**	**3,206** **2,400**	2 Good to Very Good
Falmouth Site Code: 7129	**Spring Bars Rd** **E of Worcester Court Av** X -70.5969 Y 41.5580	**7/20/2011** **7/22/2011**	**5,674** **4,300**	5 Poor Severe longitudinal, transverse, and alligator cracking
Falmouth Site Code: 20237	**Woods Hole Rd** **S of Oyster Pond** X -70.6486 Y 41.5426	**7/20/2011** **7/22/2011**	**10,587** **8,000**	3 Fair to Good rutting, one small pothole
Harwich **& Brewster** Site Code: 20498	**Rt 124** **@ Harw/Brew TL** X -70.0849 Y 41.7260	**8/1/2011** **8/3/2011**	**6,670** **5,100**	4 Poor to Fair Alligator and longitudinal cracking

TOWN	ROUTE & LOCATION	Begin Date: / End Date:	ADT / AADT	Pavement Conditions
Harwich Site Code: 7147	**Rt 124** **N of Rt 39** X -70.0759 Y 41.6868	**8/1/2011** **8/3/2011**	**9,928** **7,500**	3 Fair to Good Transverse cracking
Harwich **& Brewster** Site Code: 20500	**Rt 137** **@ Harw/Brew TL** X -70.0387 Y 41.7267	**8/8/2011** **8/10/2011**	**10,931** **8,300**	4 Poor to Fair longitudinal cracking, potholes
Harwich **& Chatham** Site Code: 20508	**Rt 28** **@ Harw/Chat TL (N end)** X -69.9943 Y 41.7118	**7/19/2011** **7/21/2011**	**10,792** **8,200**	4 Poor to Fair Deep rutting, long., transverse, and edge cracking
Harwich **& Chatham** Site Code: 20509	**Rt 28** **@ Harw/Chat TL (W end)** X -70.0317 Y 41.6790	**7/19/2011** **7/21/2011**	**10,217** **7,800**	3 Fair to Good transverse cracking, slight longitudinal cracking
Harwich Site Code: 20511	**Rt 28** **E of Sisson Rd (Rt 39)** X -70.0916 Y 41.6716	**8/1/2011** **8/3/2011**	**12,097** **9,200**	4 Poor to Fair Transverse, longitudinal, alligator, and block cracking
Harwich Site Code: 20474	**Depot Rd (E)** **N of Rt 28** X -70.0392 Y 41.6806	**8/8/2011** **8/10/2011**	**2,874** **2,200**	3 Fair to Good edge cracking, gouging, minor transverse, longitudinal cracking. However, problems mostly in one 50-ft section
Mashpee Site Code: 20267	**Rt 151** **W of Mashpee Rotary** X -70.4891 Y 41.6183	**7/27/2011** **7/29/2011**	**15,471** **11,800**	2 Good to Very Good
Mashpee Site Code: 20268	**Rt 151** **E of Old Barnstable Rd** X -70.5074 Y 41.6170	**7/27/2011** **7/29/2011**	**21,293** **16,200**	3 Fair to Good deep rutting, longitudinal cracking
Mashpee **& Barnstable** Site Code: 20270	**Rt 28** **@ Mash/Barn TL** X -70.4604 Y 41.6336	**7/27/2011** **7/29/2011**	**25,150** **19,100**	4 Poor to Fair longitudinal, transverse, & edge cracking; deep rutting
Mashpee Site Code: 7221	**Ashers Pa** **E of Meetinghouse Rd** X -70.4797 Y 41.6288	**8/9/2011** **8/11/2011**	**1,562** **1,200**	2 Good to Very Good

TOWN	ROUTE & LOCATION	Begin Date: / End Date:	ADT / AADT	Pavement Conditions
Mashpee	**Great Neck Rd South** **S of Mashpee Rotary** X -70.4867 Y 41.6172 Site Code: 20246	**7/27/2011** **7/29/2011**	**9,855** **7,500**	3 Fair to Good — minor patched cracking
Mashpee	**Old Barn/Falm Rd** **S of Rt 151** X -70.5092 Y 41.6167 Site Code: 20254	**8/9/2011** **8/11/2011**	**3,849** **2,900**	4 Poor to Fair — pot holes, longitudinal cracking
Orleans	**Rt 28** **S of Main St** X -69.9875 Y 41.7852 Site Code: 20622	**8/3/2011** **8/5/2011**	**13,032** **9,900**	4 Poor to Fair — Longitudinal & transverse cracking, deep rutting
Orleans	**Rt 28** **N of Rt 39** X -69.9910 Y 41.7527 Site Code: 20623	**8/3/2011** **8/5/2011**	**15,947** **12,100**	3 Fair to Good — minor edge & transverse cracking, rutting
Orleans	**Beach Rd** **W of Mill Ln** X -69.9631 Y 41.7854 Site Code: 20598	**8/3/2011** **8/5/2011**	**7,526** **5,700**	3 Fair to Good — patched up, small transverse and longitudinal cracking
Orleans	**Beach Rd** **E of Nauset Rd** X -69.9424 Y 41.7889 Site Code: 20599	**8/3/2011** **8/5/2011**	**4,190** **3,200**	3 Fair to Good — minor edge cracking, otherwise repairs are holding well
Provincetow	**Rt 6A** **W of Bradford St** X -70.2074 Y 42.0403 Site Code: 7150	**8/2/2011** **8/4/2011**	**2,803** **2,100**	4 Poor to Fair — Transverse & longitudinal cracking
Provincetow	**Bradford St** **Btwn Conwell & Johnson** X -70.1847 Y 42.0546 Site Code: 20698	**8/2/2011** **8/4/2011**	**12,915** **9,800**	5 Poor — Pot holes, alligator, transverse, longitudinal, edge, & block cracking
Provincetow	**Province Land Rd** **S of Race Point Rd** X -70.2090 Y 42.0715 Site Code: 7149	**8/2/2011** **8/4/2011**	**1,060** **810**	4 Poor to Fair — Longitudinal, edge, and transverse cracking
Sandwich	**Rt 130** **S of Cotuit Rd** X -70.4894 Y 41.7152 Site Code: 20158	**7/12/2011** **7/14/2011**	**11,812** **9,000**	2 Good to Very Good

TOWN	ROUTE & LOCATION	Begin Date: / End Date:	ADT / AADT	Pavement Conditions
Sandwich Site Code: 20942	**Rt 130** **S of Rt 6A** X -70.5221 Y 41.7671	**7/12/2011** **7/14/2011**	**3,271** **2,500**	4 Poor to Fair transverse and longitudinal cracking
Sandwich **& Mashpee** Site Code: 20160	**Rt 130** **@ Sand/Mash TL** X -70.5093 Y 41.6753	**7/25/2011** **7/27/2011**	**10,074** **7,700**	2 Good to Very Good
Sandwich Site Code: 20721	**Rt 130** **N of Tupper Rd** X -70.5033 Y 41.7593	**7/6/2011** **7/8/2011**	**4,279** **3,300**	4 Poor to Fair Longitudinal and transverse cracking, rutting
Sandwich **& Barnstable** Site Code: 20162	**Rt 6A** **@ Sand/Barn TL** X -70.3967 Y 41.7263	**7/25/2011** **7/27/2011**	**5,758** **4,400**	2 Good to Very Good
Sandwich Site Code: 20144	**Cotuit Rd** **N of Quaker Meetinghouse Rd** X -70.4846 Y 41.7032	**7/6/2011** **7/8/2011**	**18,172** **13,800**	2 Good to Very Good
Sandwich **& Mashpee** Site Code: 20147	**Cotuit Rd** **@ Sand/Mash TL** X -70.4687 Y 41.6656	**7/25/2011** **7/27/2011**	**4,279** **3,300**	4 Poor to Fair longitudinal & edge cracking; raveling
Sandwich Site Code: 7224	**Harlow Rd** **E of Cotuit Rd** X -70.4695 Y 41.6695	**7/25/2011** **7/27/2011**	**3,728** **2,800**	4 Poor to Fair Edge, longitudinal, and alligator cracking, raveling
Sandwich Site Code: 21266	**Jarves St** **S of Rt 6A** X -70.4941 Y 41.7590	**8/22/2011** **8/25/2011**	**2,646** **2,000**	3 Fair to Good Edge cracking in parking lane
Sandwich Site Code: 7117	**Old County Ln** **E of Jones Ln** X -70.4053 Y 41.7234	**7/25/2011** **7/27/2011**	**643** **490**	4 Poor to Fair Transverse and edge cracking
Sandwich Site Code: 20149	**Quaker Meetinghouse Rd** **W of Cotuit Rd** X -70.4844 Y 41.7005	**7/6/2011** **7/8/2011**	**11,103** **8,400**	4 Poor to Fair Deep rutting, longitudinal cracking

TOWN	ROUTE & LOCATION	Begin Date: / End Date:	ADT / AADT	Pavement Conditions
Sandwich Site Code: 20151	**Quaker Meetinghouse Rd** **E of Peters Pond Dr** X -70.4936 Y 41.6969	**7/6/2011** **7/8/2011**	**7,511** **5,700**	3 Fair to Good one small longitudinal crack, holes in the curb
Sandwich **& Barnstable** Site Code: 20155	**Race Ln** **@ Sand/Barn TL** X -70.4360 Y 41.6868	**7/25/2011** **7/27/2011**	**6,777** **5,200**	4 Poor to Fair Transverse and edge cracking, deep rutting
Sandwich Site Code: 20941	**Tupper Rd (W end)** **N of Rt 6A** X -70.5197 Y 41.7677	**7/12/2011** **7/14/2011**	**3,958** **3,000**	5 Poor Longitudinal cracks, rutting, upheaval, raveling, and corrugations
Truro **& Provincetow** Site Code: 20696	**Rt 6A** **@ Trur/Prov TL** X -70.1474 Y 42.0636	**8/2/2011** **8/4/2011**	**4,019** **3,100**	4 Poor to Fair Gouging and transverse cracking
Truro Site Code: 20683	**Depot Rd** **W of Castle Rd** X -70.0502 Y 41.9918	**8/2/2011** **8/4/2011**	**2,564** **1,900**	4 Poor to Fair Transverse, longitudinal, block, and alligator cracking
Truro Site Code: 20684	**Head of the Meadow Rd** **E of Rt 6** X -70.0818 Y 42.0409	**8/2/2011** **8/4/2011**	**2,079** **1,600**	2 Good to Very Good
Truro Site Code: 20686	**Hughes Rd (S End)** **W of Rt 6A** X -70.0795 Y 42.0288	**8/2/2011** **8/4/2011**	**608** **460**	4 Poor to Fair transverse & edge cracking
Wellfleet Site Code: 20842	**Rt 6** **S of Lecount Hollow Rd** X -69.9869 Y 41.9129	**7/26/2011** **7/28/2011**	**25,709** **19,500**	4 Poor to Fair severe kibg, cracking, transverse cracking at edges
Wellfleet Site Code: 20660	**Briar Ln** **W of Rt 6** X -70.0318 Y 41.9444	**7/26/2011** **7/28/2011**	**2,718** **2,100**	4 Poor to Fair transverse, long., edge cracking
Wellfleet Site Code: 20661	**Cahoon Hollow Rd** **E of Rt 6** X -70.0197 Y 41.9358	**7/26/2011** **7/28/2011**	**2,952** **2,200**	3 Fair to Good One transverse crack, otherwise good

Cape Cod Pavement Management System - ATR Locations

TOWN	ROUTE & LOCATION	Begin Date: / End Date:	ADT / AADT	Pavement Conditions
Wellfleet Site Code: 20662	**Commercial St** **S of Holbrook Ave** X -70.0297 Y 41.9309	**7/26/2011** **7/28/2011**	**7,178** **5,500**	4 Poor to Fair Block, transverse, & long. cracking; deep rutting
Wellfleet Site Code: 20664	**Gross Hill Rd** **E of Rt 6** X -70.0238 Y 41.9446	**7/26/2011** **7/28/2011**	**1,375** **1,000**	4 Poor to Fair transverse, long., & alligator cracking
Wellfleet Site Code: 20665	**Gull Pond Rd** **E of Rt 6** X -70.0312 Y 41.9480	**7/26/2011** **7/28/2011**	**1,112** **850**	5 Poor Block cracking, potholes, utility patch failure, settlement, edge cracking
Yarmouth Site Code: 20395	**Rt 28** **E of North Main St** X -70.1847 Y 41.6667	**7/13/2011** **7/15/2011**	**19,854** **15,100**	4 Poor to Fair longitudinal & transverse cracking; black patching held on asphalt
Yarmouth Site Code: 20357	**Buck Island Rd** **E of West Yarmouth Rd** X -70.2270 Y 41.6647	**7/11/2011** **7/13/2011**	**8,153** **6,200**	2 Good to Very Good
Yarmouth **& Dennis** Site Code: 20838	**Setucket Rd** **@ Yarm/Denn TL** X -70.1859 Y 41.7128	**7/13/2011** **7/15/2011**	**6,352** **4,800**	2 Good to Very Good

CAPE COD COMMISSION

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